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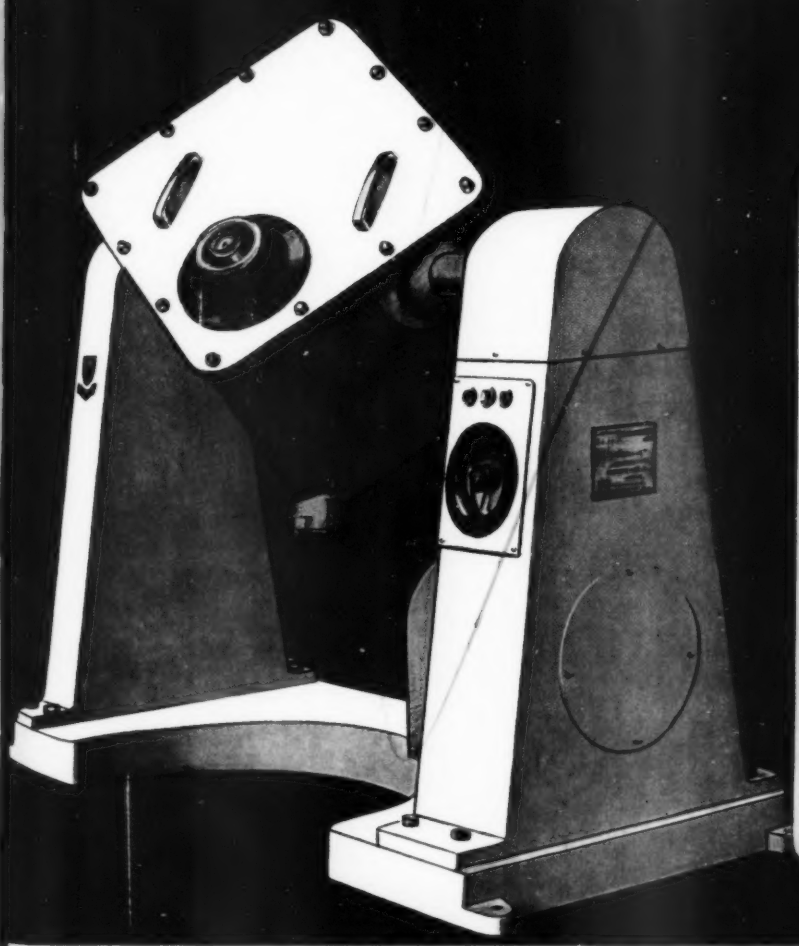

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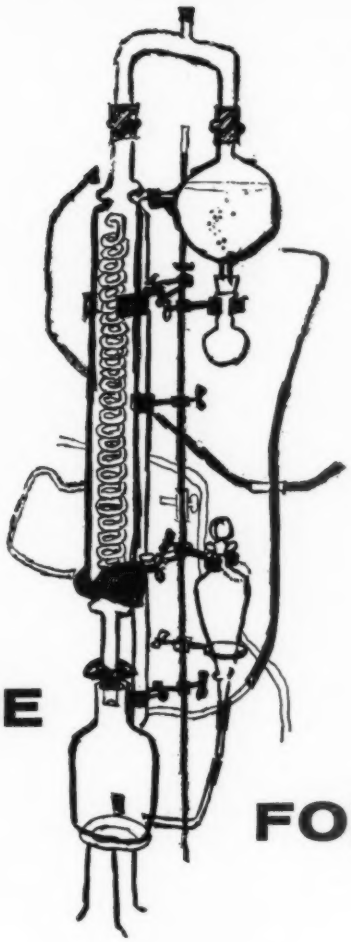

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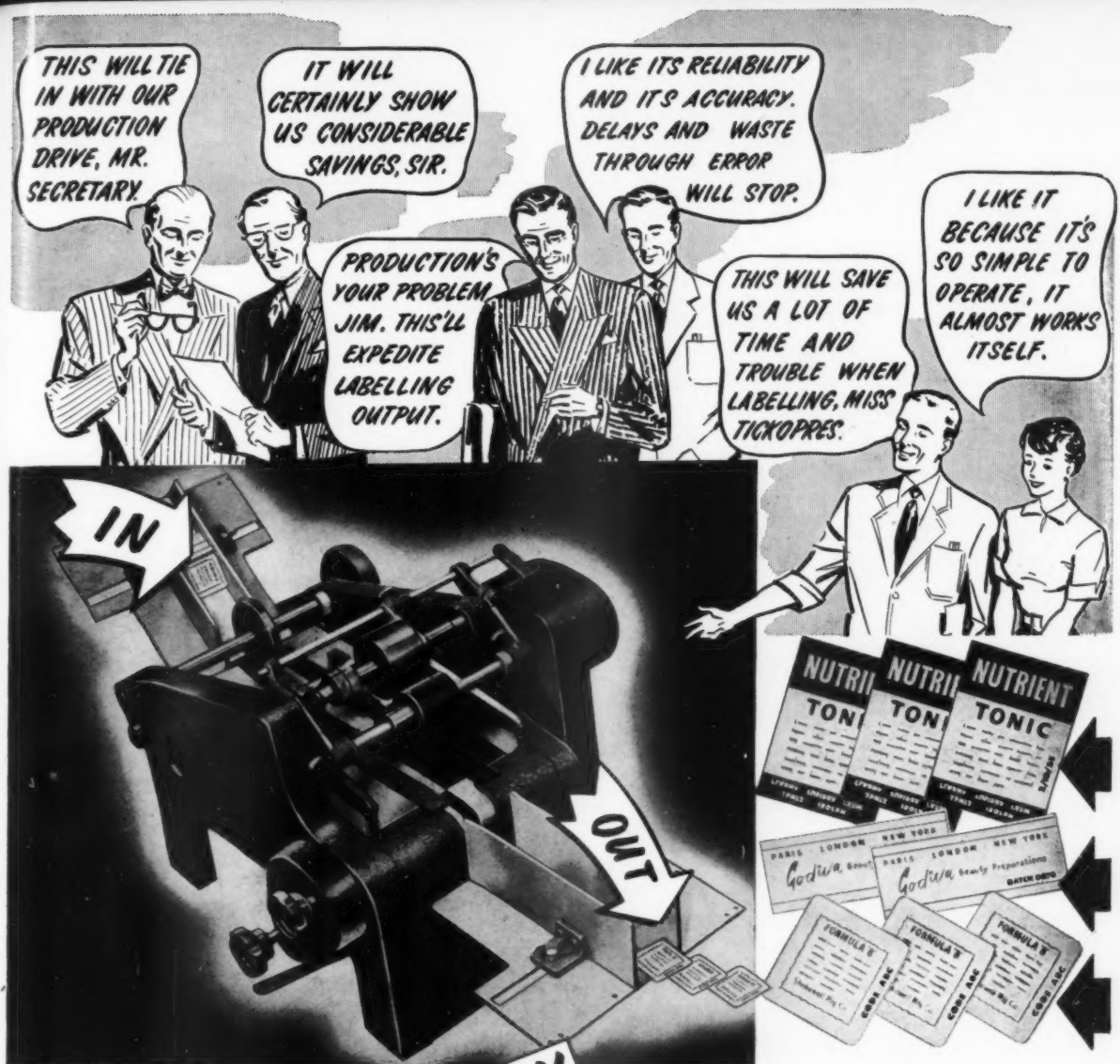
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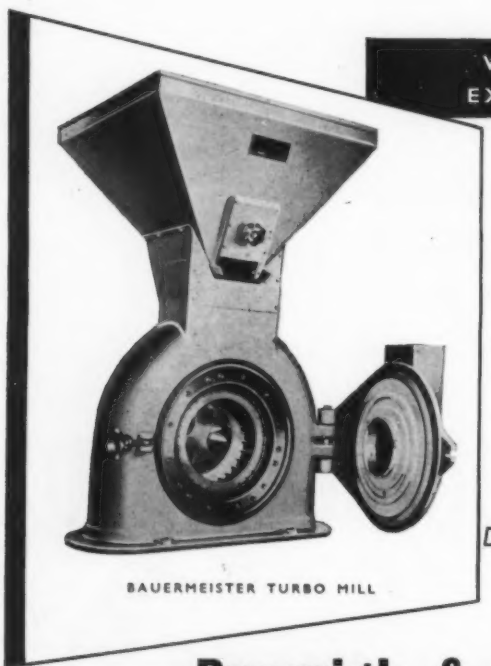

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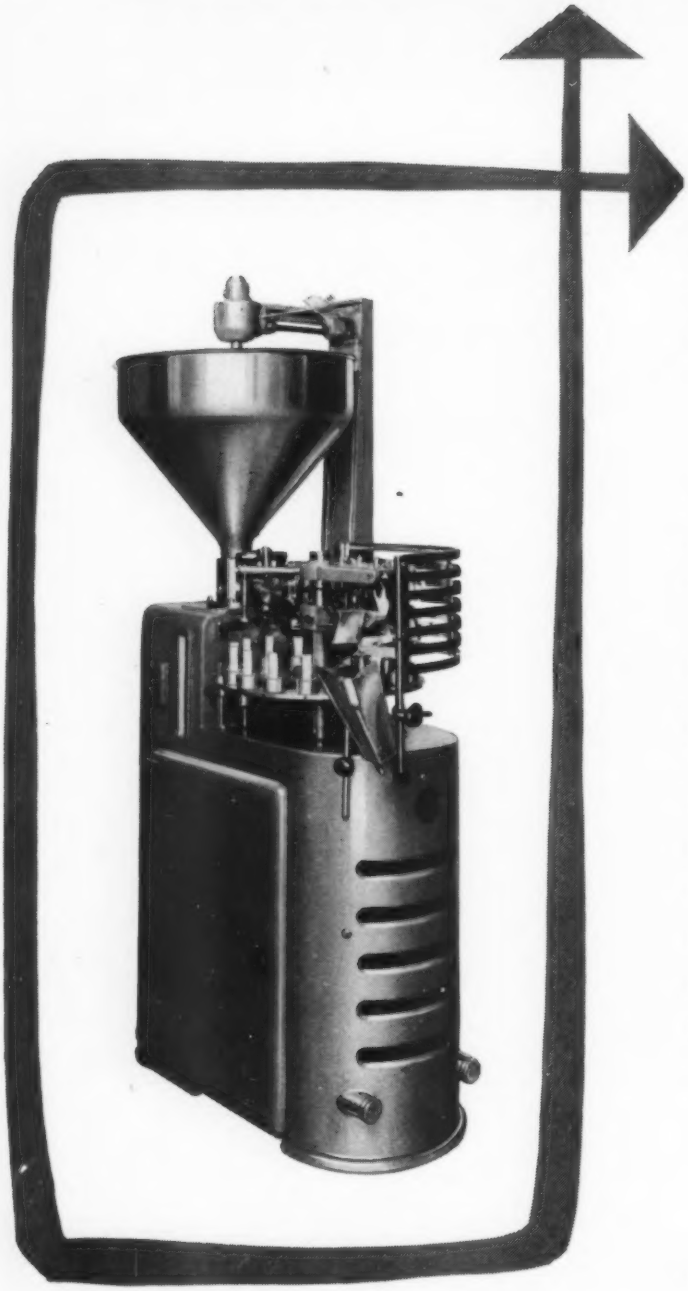

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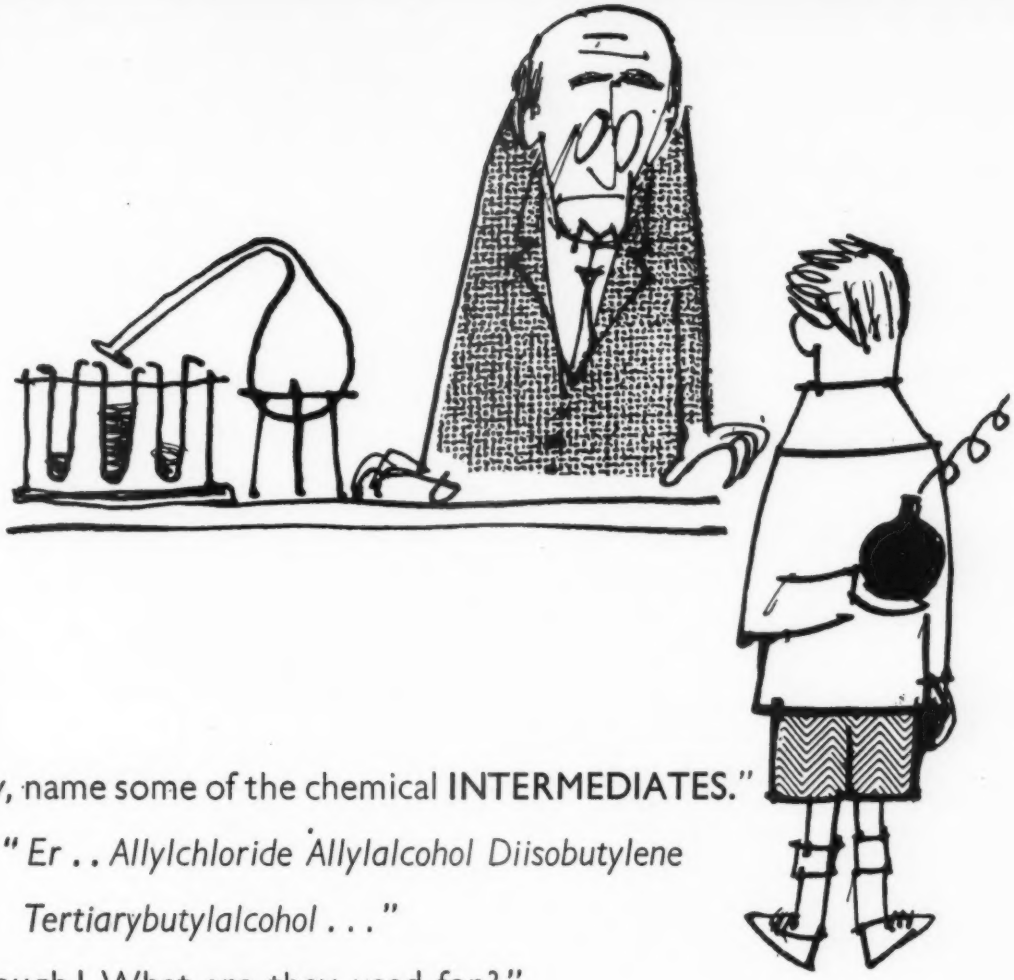

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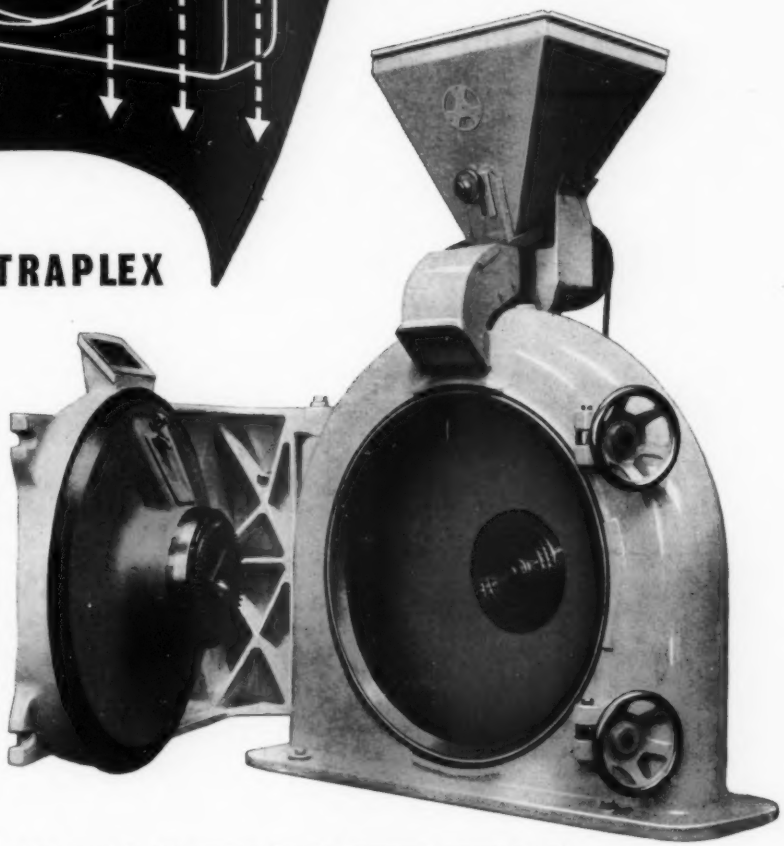

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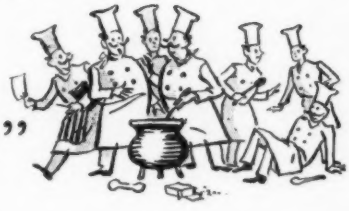
"Too many cooks spoil the broth" 

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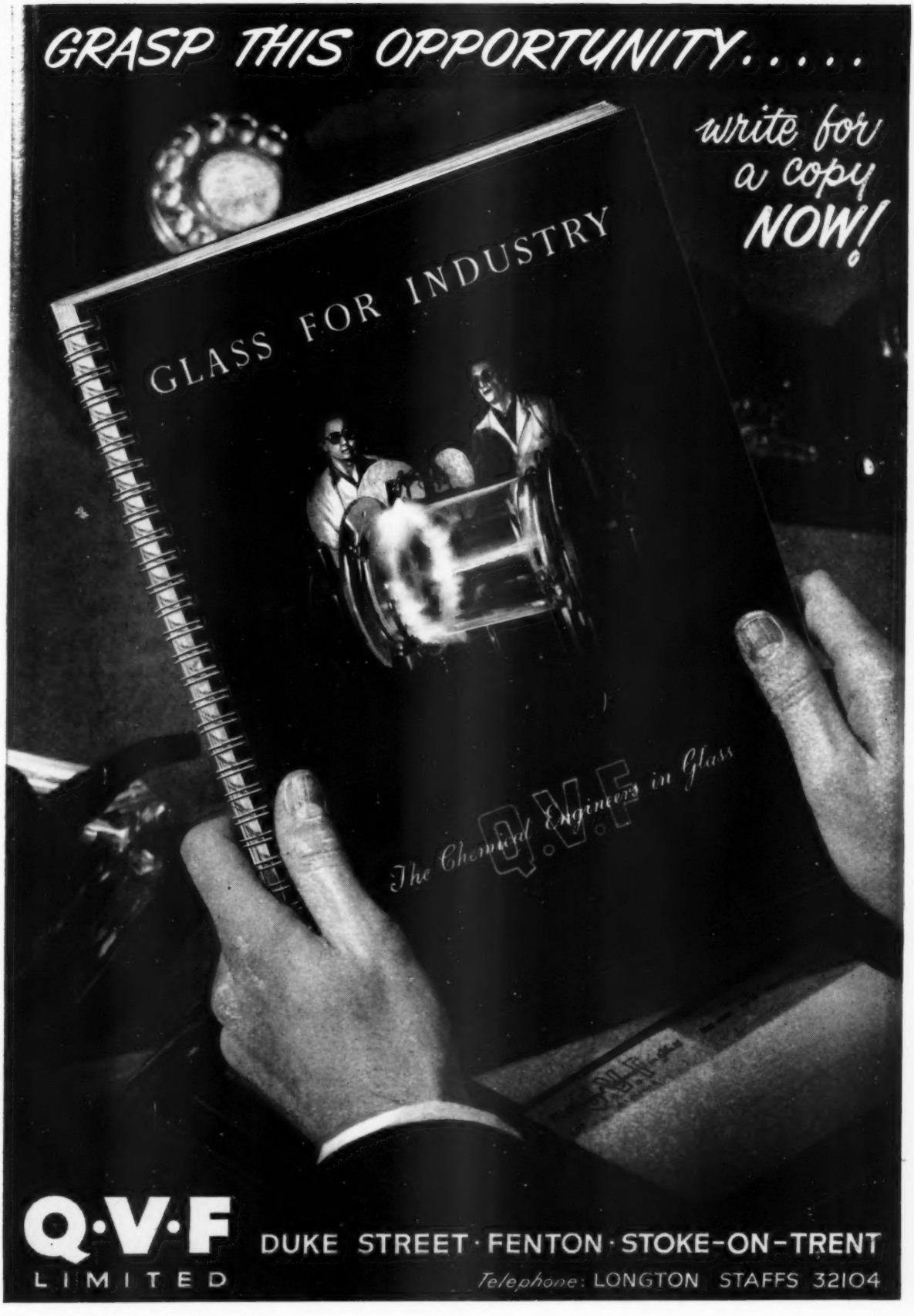
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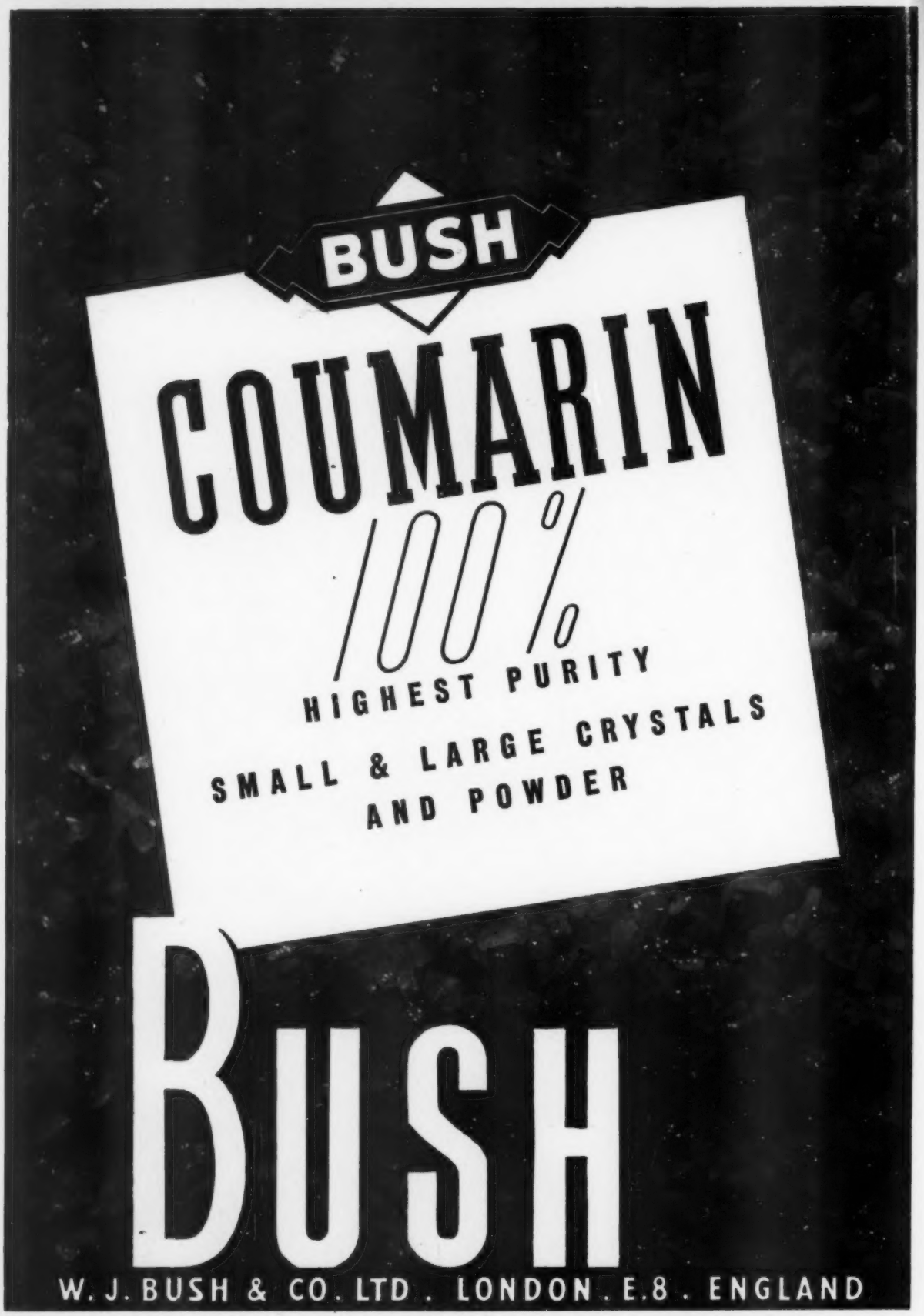
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EQUIPMENT for grinding and blending to fine quality powders and dusts.

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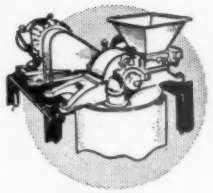
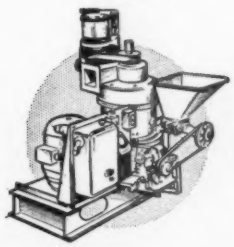


The Mikro-Pulverizer

A high speed mechanical pulverizer offering a wide range of particle sizing, (10-300 mesh) safe and economical for both wet and dry grinding. Available in six sizes with capacities from 10-10,000 lbs. per hour.



The Mikro-Bud

A new vertical hammer mill with built-in air classifier for the reduction of solids to within the 80-10 micron range. Particle sizing can be changed in seconds while the machine is in operation.
10°F maximum temperature rise.
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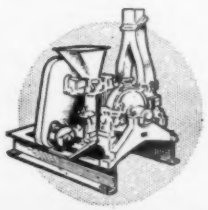

The Mikro-Atomizer

A mechanical, screenless mill for the production of smooth, ultra-fine powders in the lower micron range (25-1 microns). Compact and highly efficient. Available in three sizes with capacities from 5-5,000 lbs. per hour.

PULVERIZING MACHINERY LIMITED

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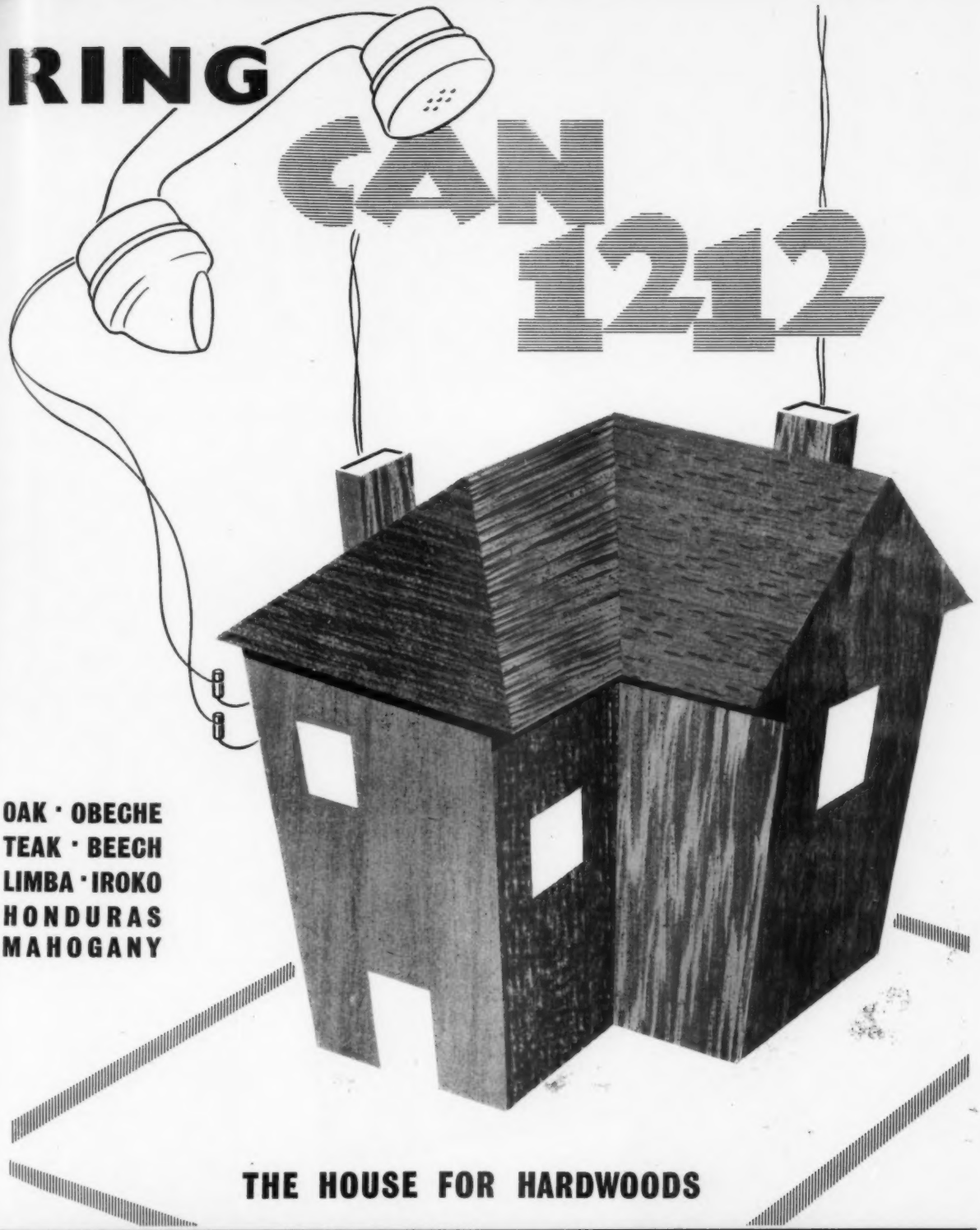

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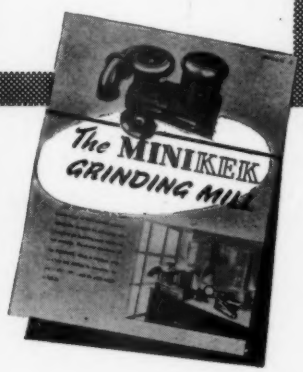

FULL DETAILS OF THE MINIKEK

Full details are given in an illustrated leaflet, available free on request.

KEK Limited

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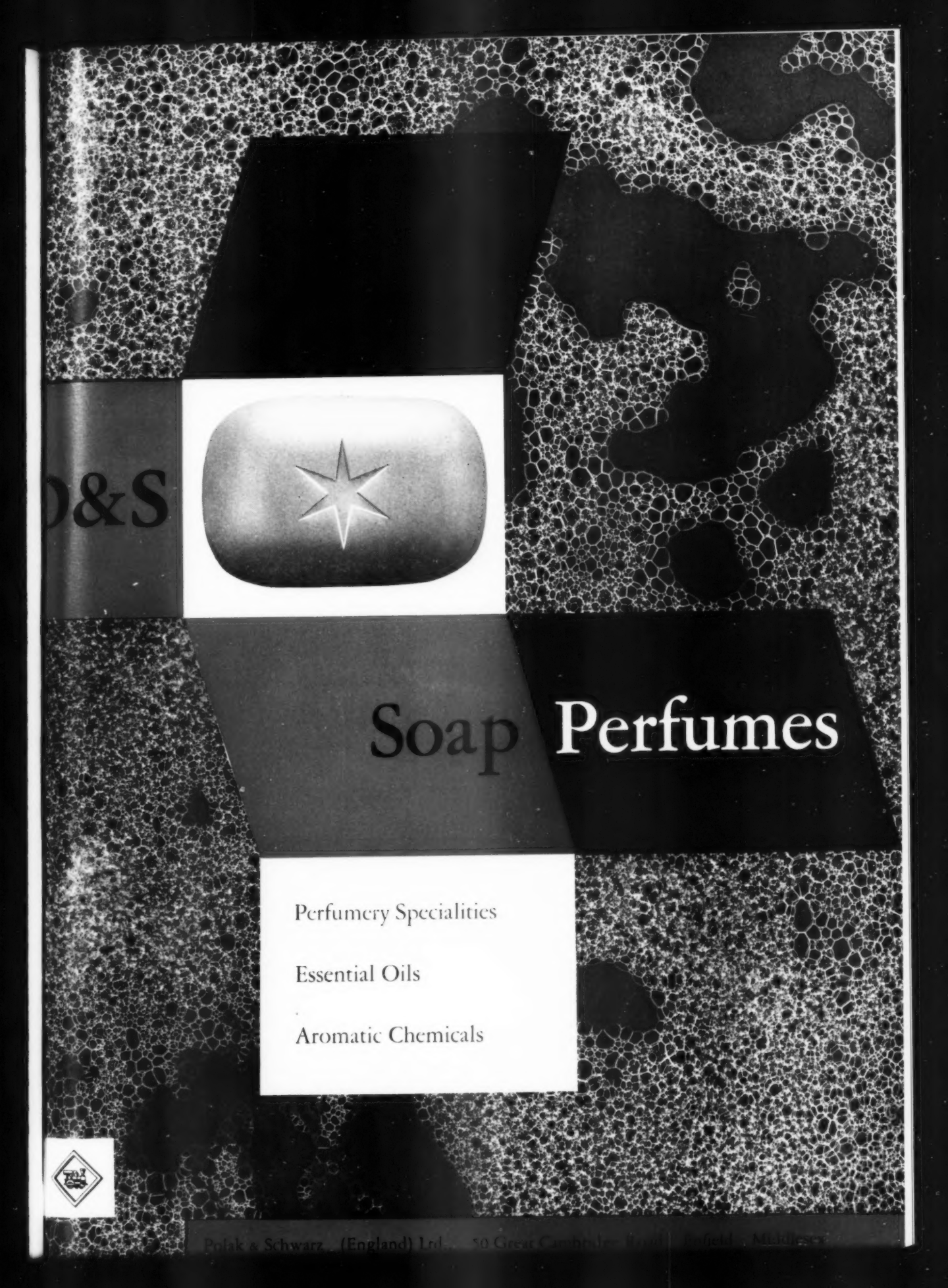
specialists in the manufacture of grinding & blending plant and equipment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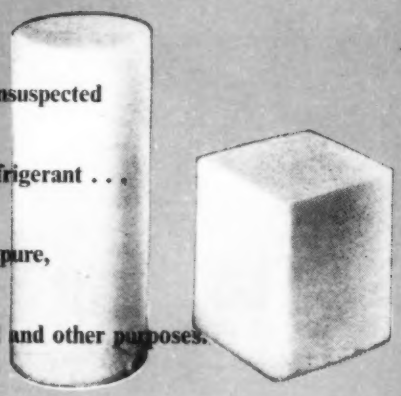

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serves the chemical industry

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'Drikold' is the registered trade name of the solid carbon dioxide made and marketed by Imperial Chemical Industries Ltd.

Full information on request.

Imperial Chemical Industries Ltd., London, S.W.1.

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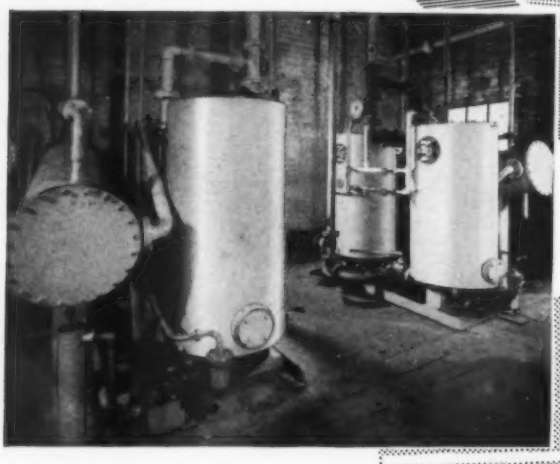
UGB CLOSURE DIVISION

Drying Hydrogen for Carbide Tools



In the manufacture of Prolite tungsten-carbide tools, Murex Limited use Birlec adsorption dryers to remove water vapour from their electrolytic hydrogen supply.

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Illustration above:—
Birlec adsorbers for hydrogen drying.

Illustration right:—
Electrolytic hydrogen plant at Murex Limited.

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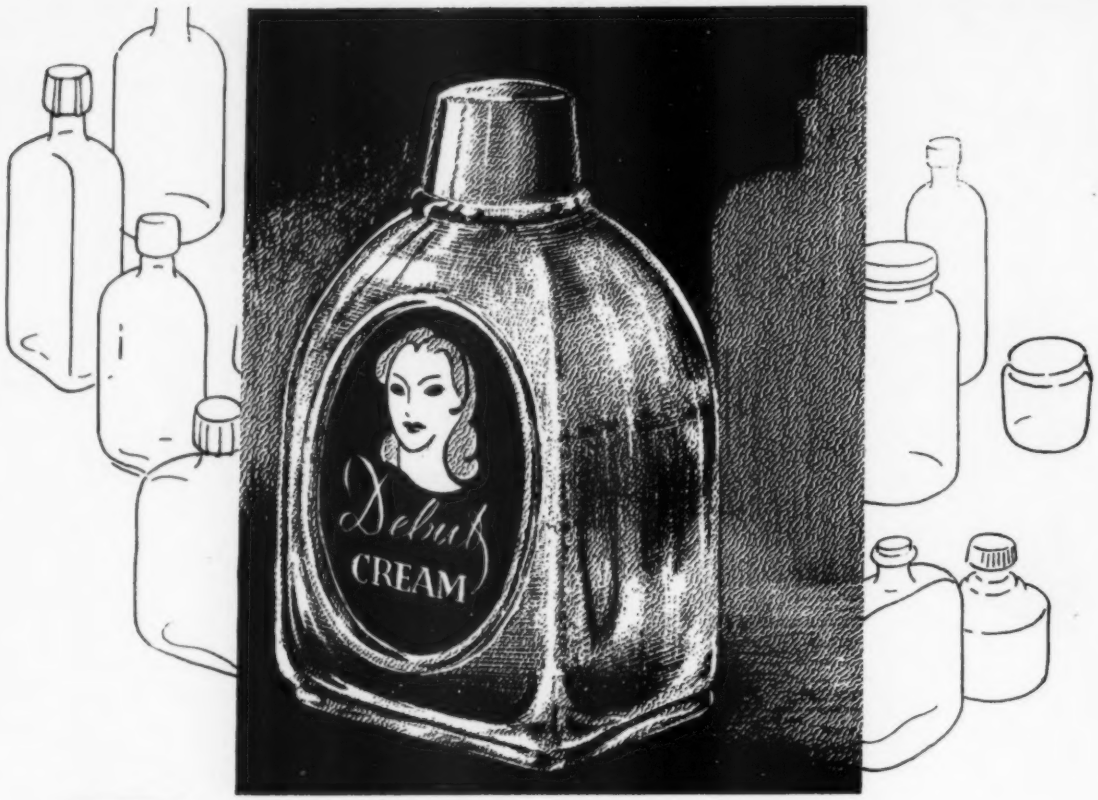

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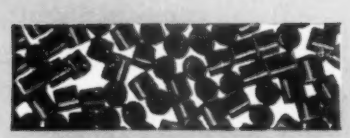

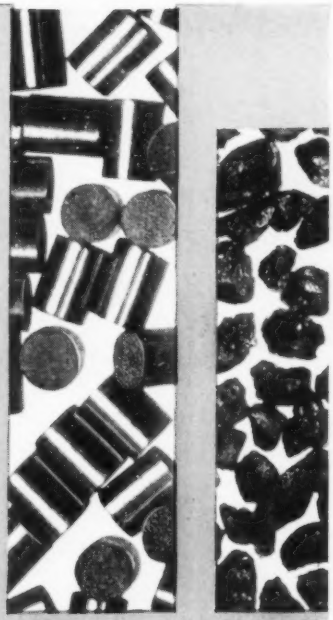

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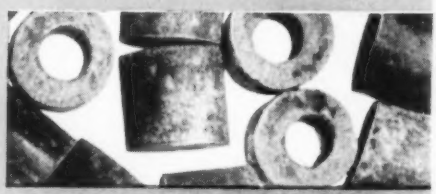

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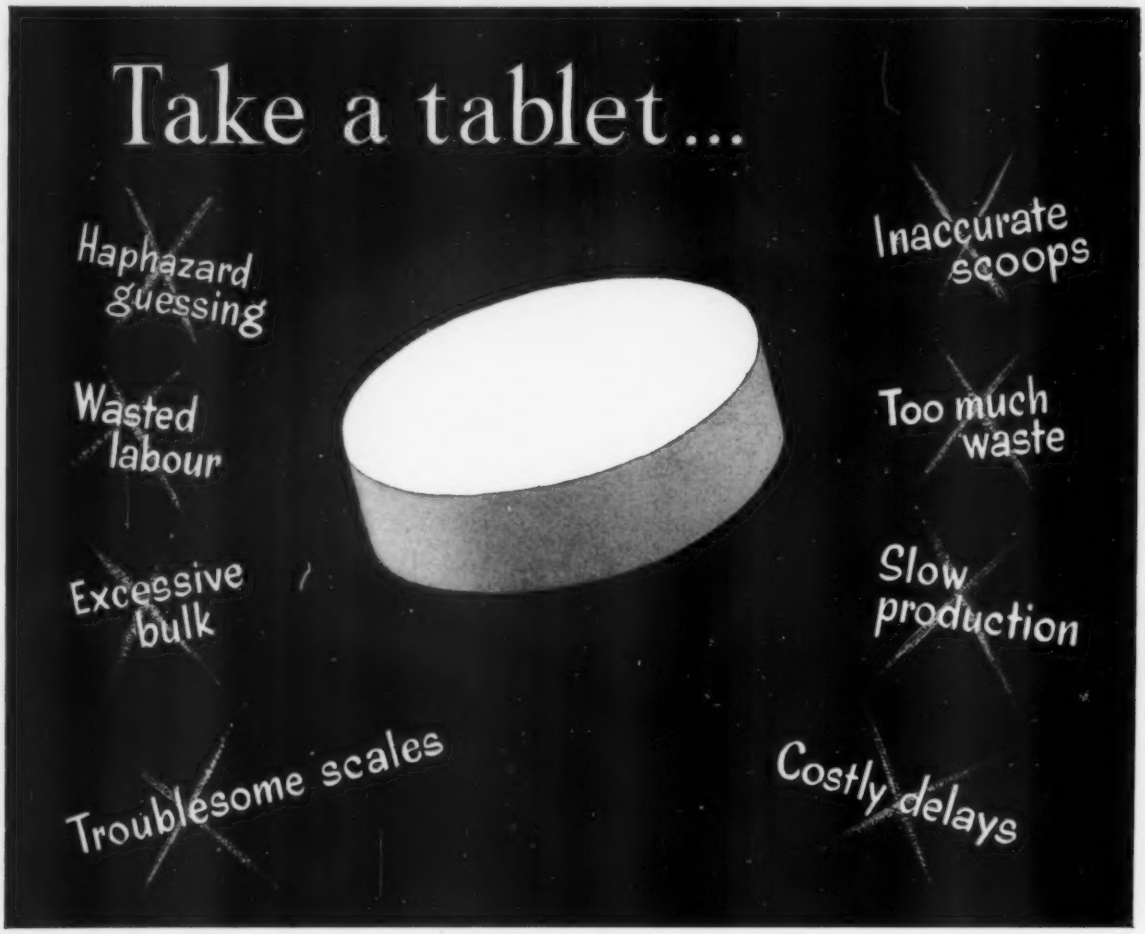

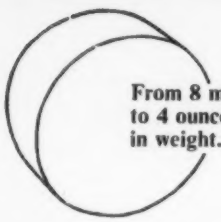

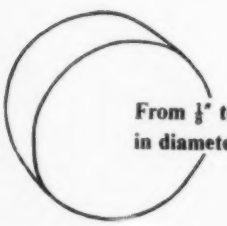

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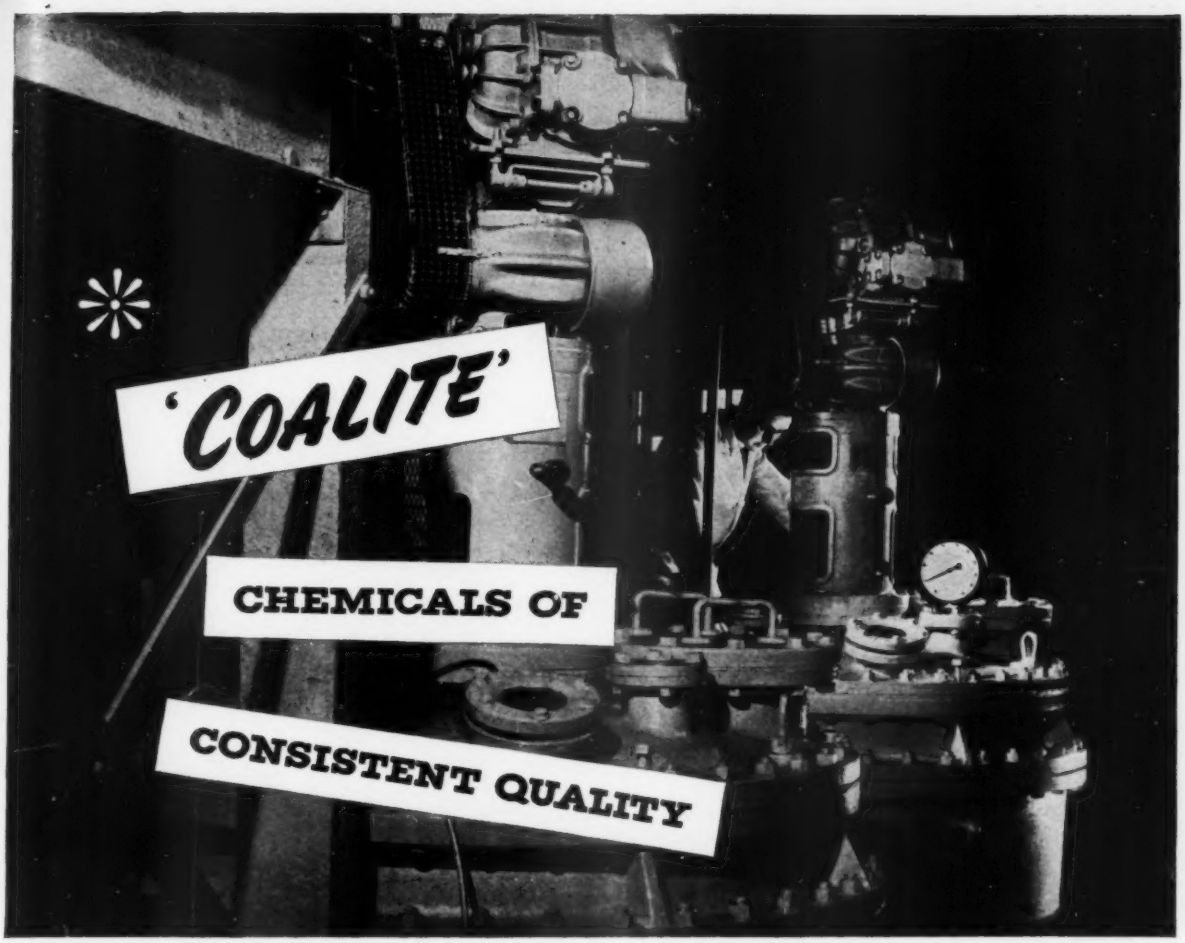

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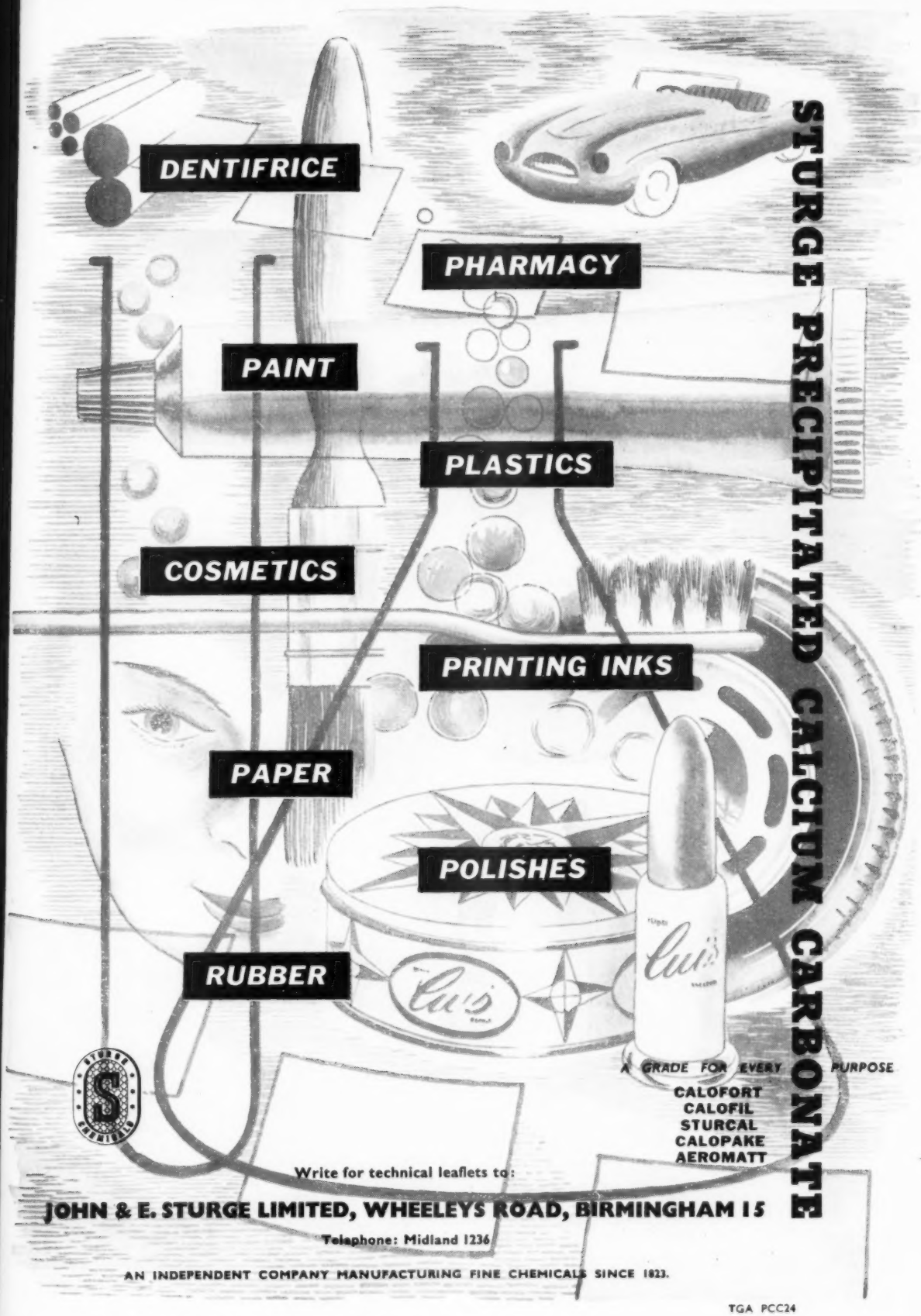
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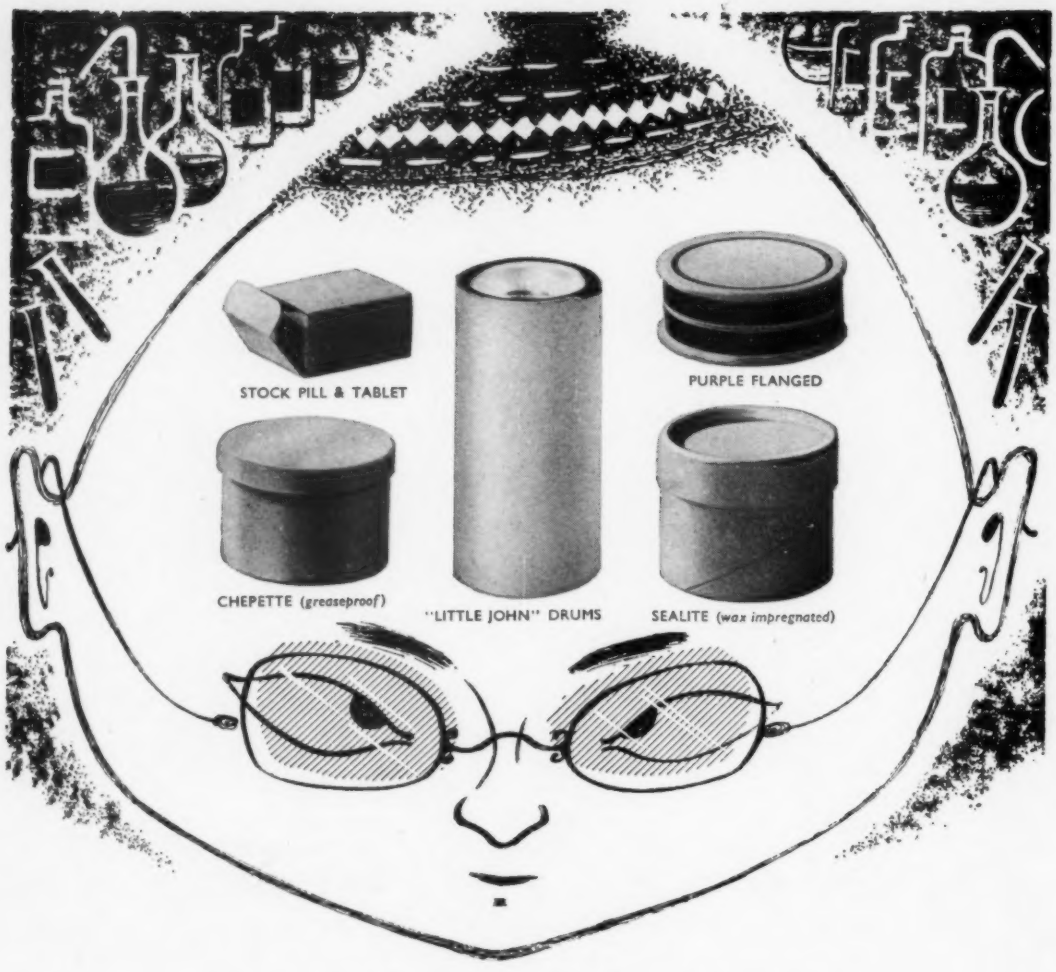

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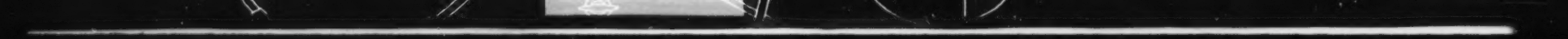

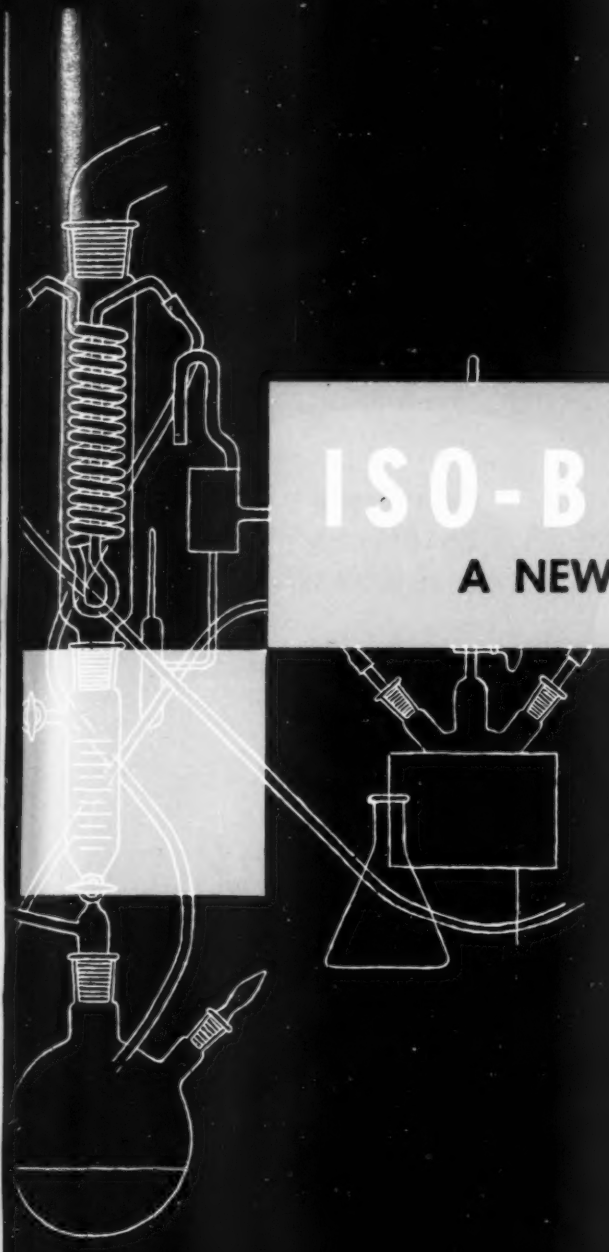

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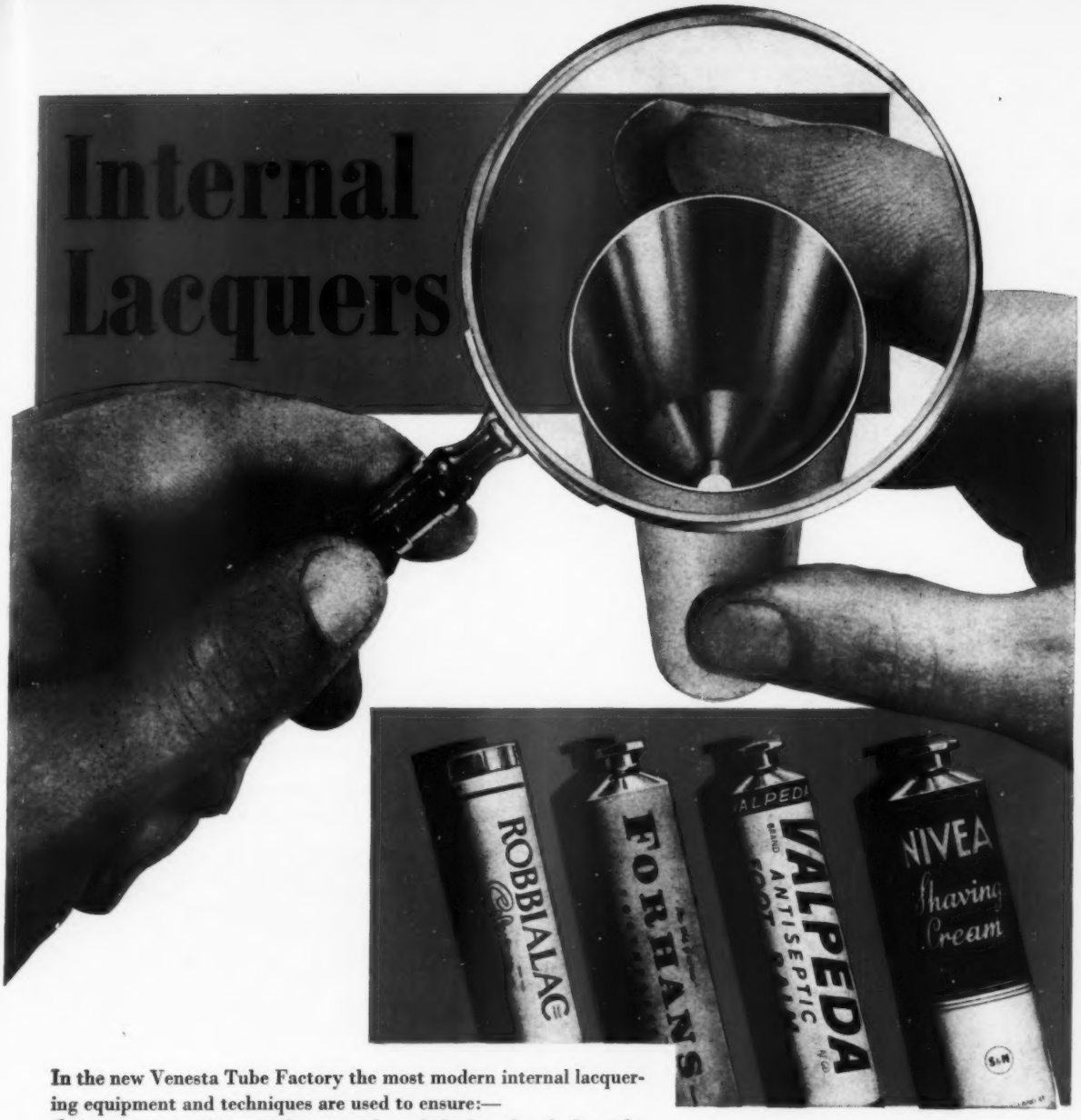

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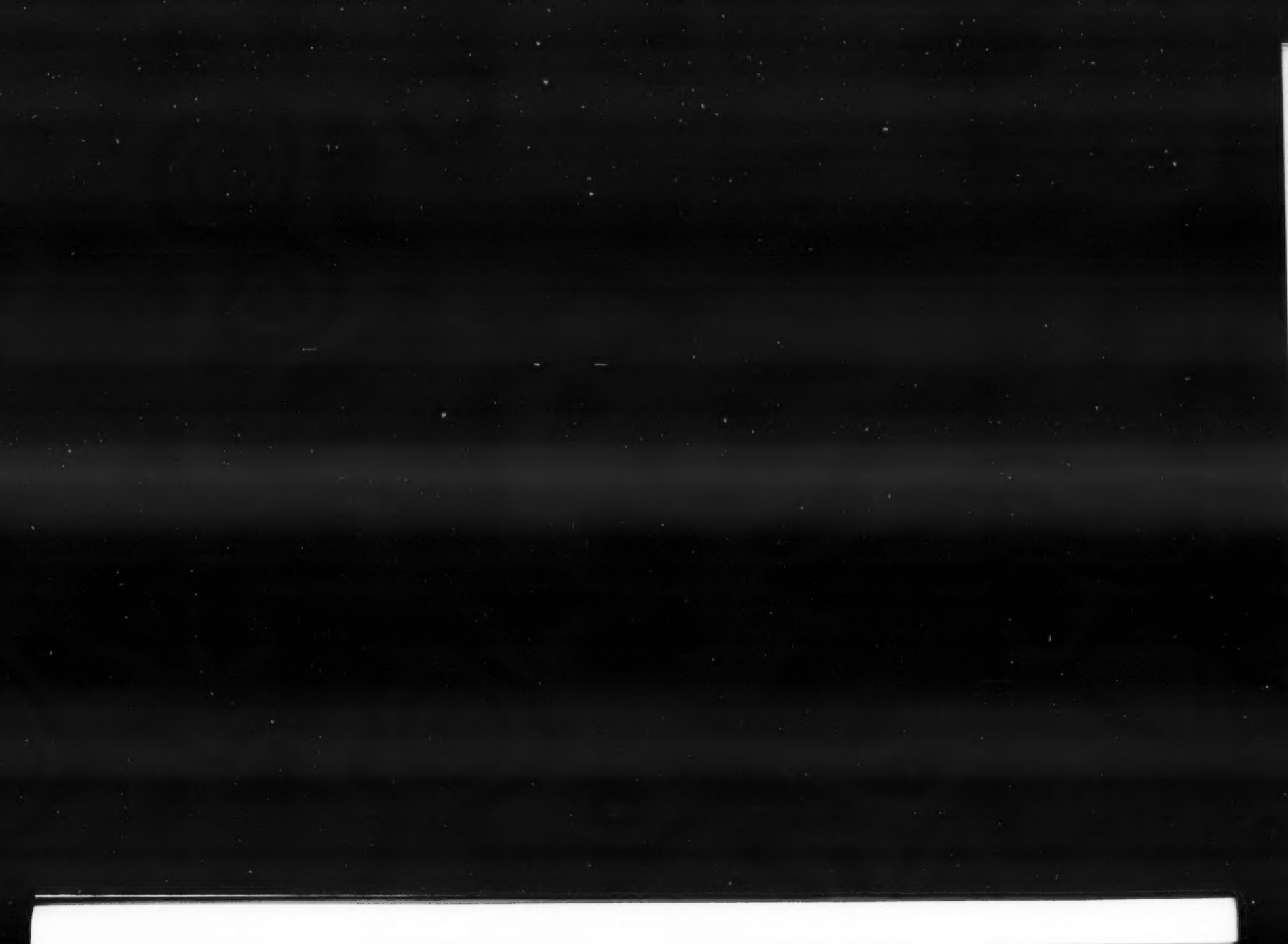

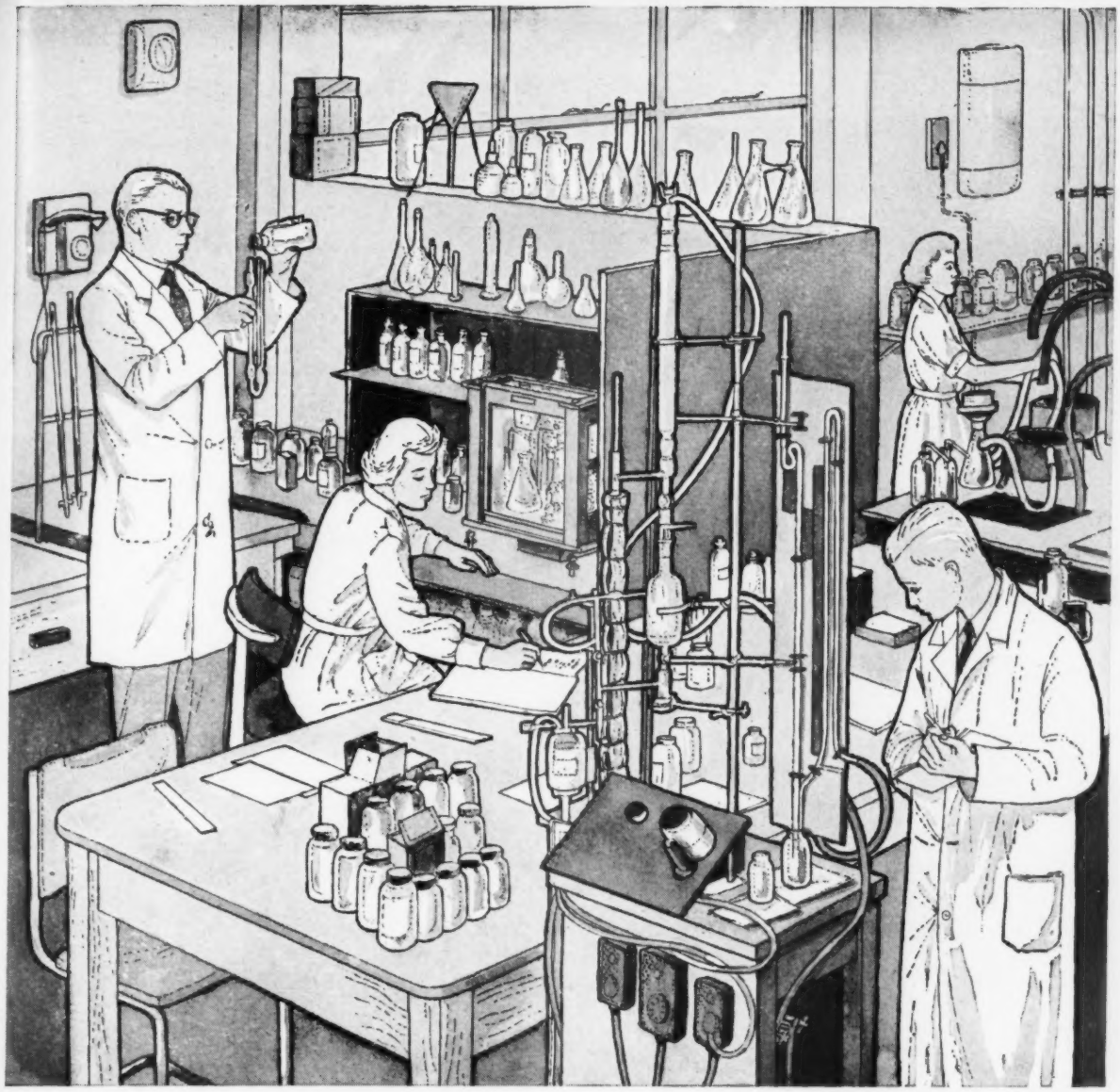

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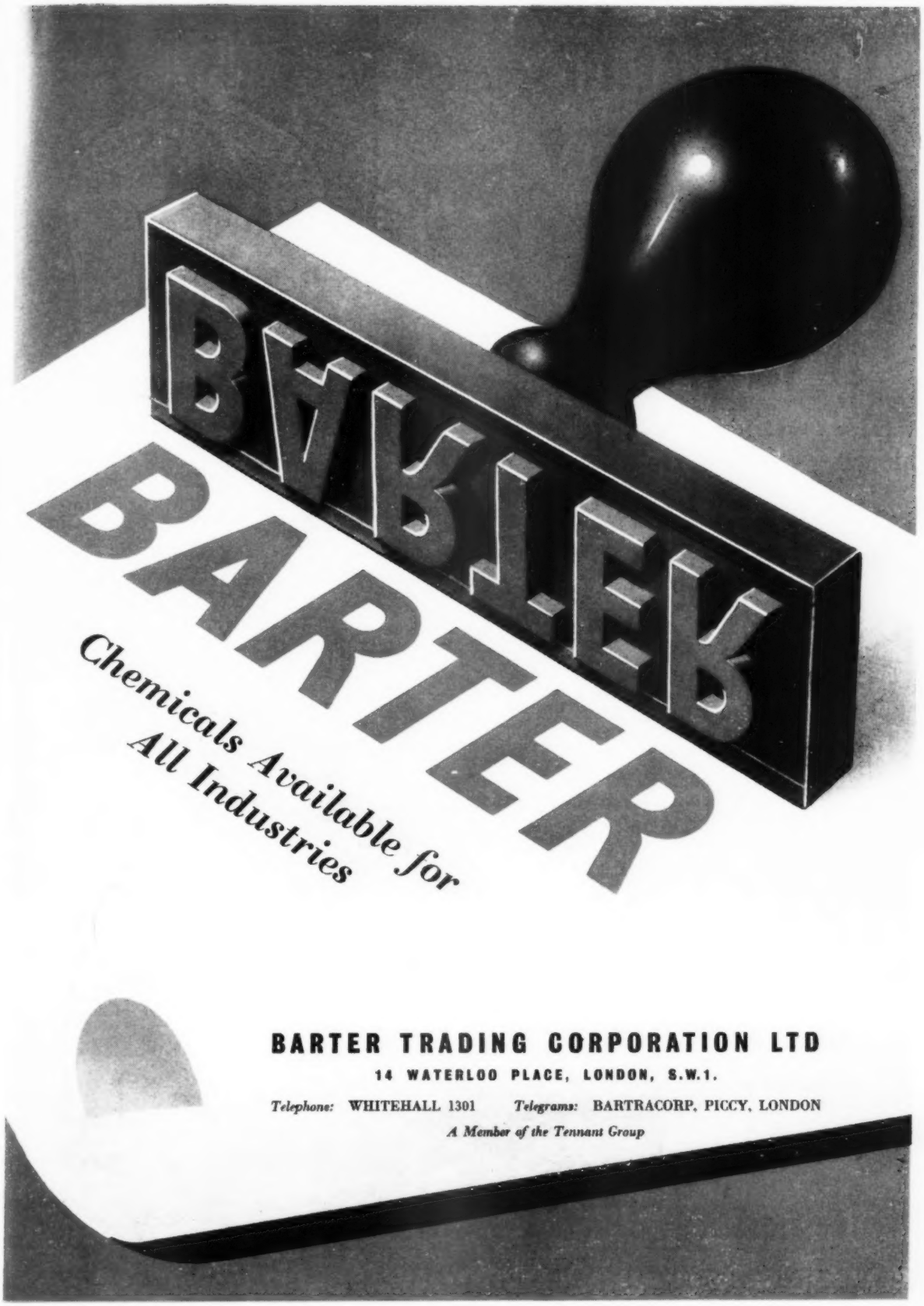
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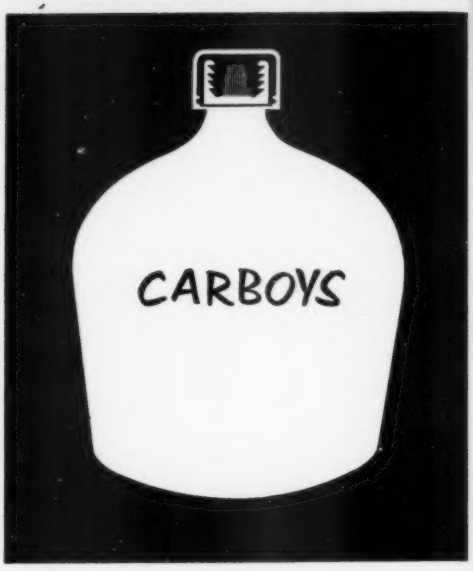

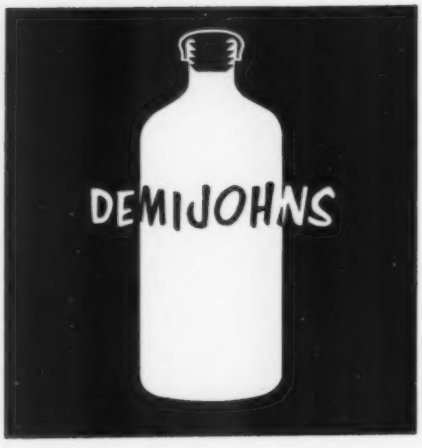

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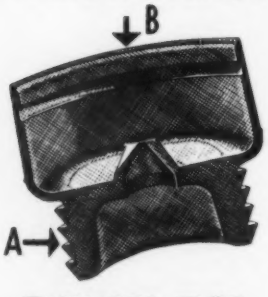

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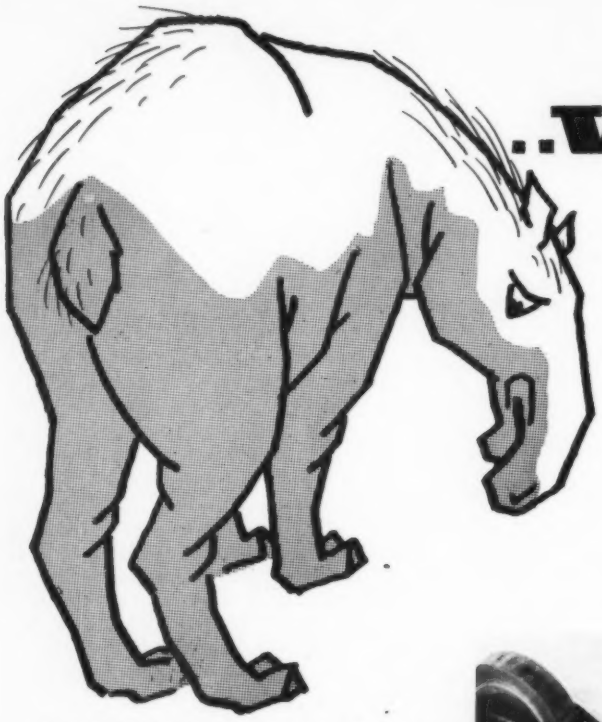

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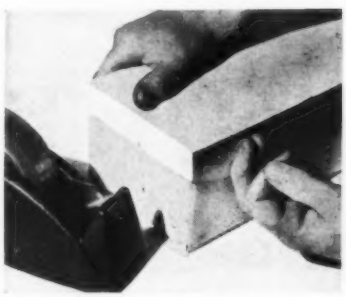

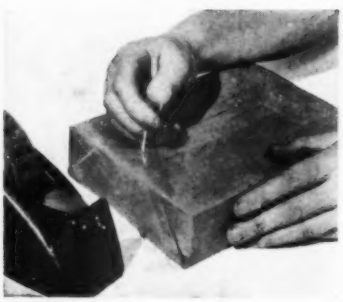

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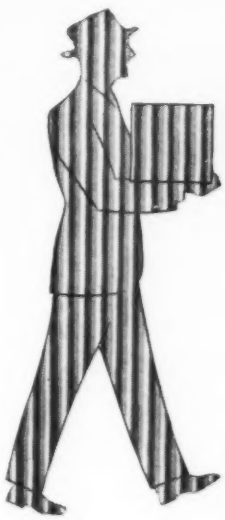

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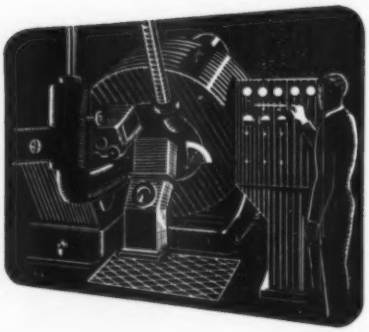

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Vol. XXIX, No. 2 — FEBRUARY, 1958

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TOPICS AND COMMENTS

Inspiration for youth

THE days when the British Association meetings provided national occasions for the announcement of major scientific discoveries have long since passed and many people have been asking whether such a large, amorphous body has a *raison d'être* in this age of intense specialisation when new branches of science and technology develop continuously and with them specialist discussion groups and societies and, very often, equally specialised journals. The presidents and officers of the British Association have for some years been giving considerable thought to the relevance of the Association in the conditions of today. They have drawn inspiration from the full name of their organisation—the British Association for the *Advancement* of Science—and have decided that one of the ways it can advance science is to help make young people want to become scientists.

It has fallen to this year's president, Sir Alexander Fleck, F.R.S., chairman of I.C.I., to announce the B.A.'s plans for popularising science. Firstly area committees are to be formed to foster inter-annual meeting activities, including local exhibitions and lectures. Secondly a panel of lecturers is to be formed. This will comprise at least 100 people who have the gift—and it is a gift—of explaining science in lay terms and at the same time in inspiring terms. Sir Alexander admitted that such a large number of uniquely qualified people will not be easy to find, and he was quick to assert that the capacity for speaking simply about science is an art that can be cultivated. It can indeed be cultivated, but it would be mistaken not to recognise that this means hard and dedicated work. It is tremendously important for our young people to take up science. We cannot have enough people capable of either practising science or at least understanding it sufficiently to appreciate how it is changing our lives. And because this is so important it is vital to have really able people on the B.A.'s panel of lecturers. A poor lecturer is worse than no lecturer at all—not only will he make science seem dull and incomprehensible but he will also give youngsters a poor impression of what scientists are like.

We certainly wish the B.A. every success in its important and difficult task. We hope that its example may inspire the newspapers to give more space to science and also to give it different treatment from the latest sensation about crime or gambling. What a fearful rod the newspapers have made for themselves by insisting that everything must be sensationalised to qualify for a headline. Television too, that terribly potent creator of mass opinion, must also mend its ways in its treatment of science. Here there is no lack of money to get the best people to write and appear in science programmes. But some current programmes leave a threadbare, pinchpenny impression. This is heightened by the times at which some programmes are screened. Who on earth wants to be enlightened half-an-hour before midnight?

Challenge and change in Canada

BRITISH chemists this year have more reason than usual to survey with understanding and appreciation the achievements of their Canadian colleagues. In September the Society of Chemical Industry is holding its annual meeting in Canada, the first overseas meeting since before the war. Those members fortunate enough to be able to make the trip will, between the many acts of hospitality planned by the generous Canadian hosts, have the opportunity of seeing the chemical and allied industries of Shawinigan Falls, Brockville, Three Rivers and Sarnia. The background to modern Canadian chemical industry has been admirably illumined by Mr. Greville Smith, president of Canadian Industries Ltd., and this year's president of the S.C.I.

In a lecture to the Society's Toronto section he proudly points out that chemistry was being taught in Quebec well before 1800. The first Canadian professor of chemistry, H. H. Crofts, was appointed in 1843. Clearly the pioneers of the New World were not slow in appreciating the importance of chemistry. If anything, they were ahead of their time, for Canada did not possess the basis of a chemical industry in those days. In the middle of the nineteenth century, however, Canada was the world's largest exporter of potash, exporting about a million dollars' worth a year. The first chemical industry was soap making and later the lead-chamber sulphuric acid process was imported from Europe. The development of cheap hydro-electric power stimulated the growth of the great electrochemical and electrometallurgical industries at Buckingham, Niagara, Shawinigan, Windsor and Arvida; a distinctive Canadian chemical industry began to take shape. One result was Thomas L. Willson's attempt to make calcium metal for alumina reduction by reacting coke and limestone in an electric furnace; the attempt failed, but out of it came calcium carbide and acetylene chemicals.

In the academic world Ernest Rutherford at McGill University was matching industrial achievements with his work on radioactivity. Later, in the first World War, Canadian chemists pioneered an acetone process which was the basis for a series of organic chemicals based on calcium carbide. As in this country, the war underlined the scarcity of chemists and the National Research Council was formed to remedy matters. The second World

War found Canada ready to play its part in the common effort. Explosives, synthetic rubber, fertilisers and petroleum chemicals were manufactured; heavy water was made for nuclear reactors. The great metallurgical industries were developed.

Mr. Smith thinks that the two most promising areas of chemical development in Canada today lie in the recovery and reduction of ores and the separation of metals, and in the extraction of chemicals for wood. Within the next 25 years he foresees "startling" developments in wood chemistry.

There are problems, however. One is the scarcity of chemists and chemical engineers. The 500 a year now produced only just meet industry's demands, leaving none available for teaching posts. Then there is the philosophy—persuasive in money terms—that Canada should be content to export its natural resources and not develop its secondary industries. Mr. Smith opposes this idea, not least because it would stifle the development of chemical industry. Canadian manufacturers, he urges, must look to ways of increasing their share of the Canadian market by revision of tariffs, by greater processing of their resources before export, and by development of secondary industry.

Unsuspected hazards

CASES OF industrial poisoning through gassing declined slightly in 1956, to 236 compared with 255 in 1955. Compared with the phenomenal total of 776 in 1942 this is certainly something of an achievement.

According to the annual report of the Chief Inspector of Factories for 1956, carbon monoxide, the commonest cause of asphyxia, accounted for 11 deaths out of a total of 89 reported cases. Other fatalities occurred through contact with sulphuretted hydrogen, nitrous fumes, ammonia, benzol, petrol and benzine, and hydrocyanic acid.

The report draws attention to the risks involved when the effects of a substance are not known to either the worker or his employers. One incident occurred in a chemical works laboratory when a glass flask burst during the distillation of ether from diethyl amino-ethyl chloride. No discomfort was experienced at the time, but later the after effects of the fumes caused severe eye irritation and, in some cases, temporary blindness. The other accident took place in an organo-phosphorous insecticide plant when dimethyl dithiosphoric acid escaped on to the floor owing to the blocking of a filter. Temporary eye irritation and pain resulted. In both cases the firms were unaware of the dangerous nature of the substances.

The best safeguard against these unsuspected hazards is more vigilance on the part of the employer; it is his responsibility to understand thoroughly the hazards of the materials in his factory and to ensure that all concerned know about them and take all necessary precautions.

Deuterium at 5 million degrees

LISTENING to Sir John Cockcroft and his colleagues explaining their work on controlled thermonuclear fusion at Harwell, it was impossible to avoid a feeling of anticlimax. Few science stories have had such an anticipatory build-up, with dark rumours of American suppression of the news and hints of political scandal. In the event it turned out that American scientists and Russian too have made considerable progress and that Harwell's success with Zeta is one of degree rather than an achievement in the absolute terms implied by the newspapers. We can certainly be proud that the whole astonishing story began with Cockcroft and Walton at the Cavendish Laboratory 25 years ago when they showed that deuterons could be fused by accelerating them with high voltages. And we can also take pleasure in the fact that Zeta is the biggest thing of its kind and that it has cost considerably less than similar American projects. However, Zeta is only the first of many long steps that will have to be taken before thermonuclear fusion can be utilised as a commercial source of electricity. Furthermore, while it is highly probable that Zeta has produced neutrons resulting from thermonuclear fusion of deuterons, no one at Harwell is prepared to be absolutely certain. However, this again is not particularly vital because Zeta undoubtedly will produce true thermonuclear fusion in due time. It is a matter of increasing the temperature and improving the stability of the discharge and these problems are small compared with those that have been overcome so far.

As is now well known, the principle of Zeta is to discharge enormous currents of up to 200,000 amperes into a stream of weakly ionised deuterium gas contained in a doughnut shaped tube of aluminium with a bore of 1 metre. The gas is at very low pressure, about one ten millionth of an atmosphere. Magnetic forces produced by this enormous current cause the gas to pinch into a thin stream of only 30 centimetres, leaving about 30 centimetres of vacuum surrounding it and separating it from the walls of the tube. This prevents the tube walls from vaporising at the temperature of 5 million deg. C. reached in the gas. Also it concentrates the heat and maintains the temperature for as long as 0·003 sec. The highly charged gas tends to whip about like a lightning flash and stabilisation is achieved with solenoid windings around the aluminium tube, the additional magnetic force pushing evenly on the gas stream and minimising kinking.

Zeta produces only a million millionth of the energy put into it. To break even temperatures of 300 million deg. C. will have to be produced in deuterium gas. This multiplication will require greater currents and, perhaps, new tube materials; ceramic-metal compounds might be tried. Looking many years ahead to commercial H-power, we can envisage the process beginning with a chemical

operation, the separation of deuterium from sea water. Five gallons will yield a gramme. The present extraction cost is 2s. per g. but this is still very cheap because 1g. deuterium is reputed to have the energy equivalent of 10 tons of coal. Chemists will still be needed to improve deuterium extraction and, no doubt, to devise means of applying the energy produced. As in conventional nuclear power production, chemists and the chemical industry will play an important rôle.

The diazo centenary

AMONG the 1958 chemical commemorations the 100th anniversary of Peter Griess's discovery of the diazo compounds is a highlight. In the laboratory and on the industrial scale the diazo-reaction has proved to be an Open Seame, a key to the preparation of so many aromatic intermediates. Apart from this the reaction itself provides an absorbing study to organic chemists. Before Griess foresaw the new class of compounds prepared by use of nitrous acid, the action of this acid on NH_2 groups in certain compounds had been casually observed. Thus in 1849 Piria noted the replacement of NH_2 by the OH group in aliphatic compounds like asparagine, while Hunt had similarly observed such a replacement in the case of aniline. Four years later Gerland, at the request of Kolbe, was studying the example of aminobenzoic acid, noting a red intermediate product and also that cold dilute solutions meant better yields.

These were but hints and inconclusive; hence Kolbe turned to Griess and asked him to undertake research in this field. Griess soon predicted a new class of compounds in which he imagined two nitrogen atoms " equivalent " to two hydrogen atoms—hence the term " diazo " which has stuck for a century and which necessitated the later use of " tetrazo " in azo-dye production. When Griess was asked to convert picramic acid into the hydroxy-derivative he found instead a peculiar intermediate with the constitution $C_6H_2N_2O(NO_2)_2$. In following up this first preparation by use of other amino-compounds Griess appreciated that he was " indebted for success in obtaining the diazo-compounds " to his maintaining cool conditions in contrast to Hunt and Gerland with their warm solutions. Griess went on to prepare the first crude yet brilliant dyes for direct use on animal fibres, as he foresaw the birth of an azo-dye industry consuming vast quantities of sodium nitrite and ice. The first coloured body he conjured was benzene azo α-naphthylamine, a dye taken up by Caro when chemist to Roberts, Dale and Co. of Manchester and produced on a large scale in the 1860s. Griess had sent a sample to Watson Smith for display at the Manchester Royal Jubilee Exhibition, the dye having a more authentic claim to priority than that made for aminoazobenzene manufactured in London in 1863.

Drugs, dyes and intermediates were to be the rich harvest of Griess's laborious efforts which began in 1858. Griess first used as source of nitrous acid the nitrous fumes produced from arsenious oxide and nitric acid, passing the gases either into a paste of the amine salt or into an alcoholic solution of the amine. He showed how, on warming the diazotised solutions of amines, phenols were produced, how the use of alcohol replaced the group by hydrogen, and went on to prepare iodobenzene and tetrazo compounds. He also used alcohol and ether to precipitate solid diazo compounds, studied coupling reactions, prepared diazobenzene salts and potassium diazotate. And when Sandmeyer in 1884 and Gattermann in 1890 widened reaction conditions by introducing cuprous salts and copper powder as catalysts, when Martius substituted sodium nitrite and dilute acid as source of nitrous acid and Knoevenagel used amyl nitrite in alcohol for preparations free from water, there seemed no limit to the possibilities.

One picturesque touch to the story of Johann Peter Griess concerns the laboratory in which he staged his curtain-raiser. He had come to London as an assistant to Hofman for three years. Then he became chemist at Allsopp's brewery at Burton-on-Trent. From the small laboratory there, ill-equipped for research in chemistry, came those first studies of his which appeared in the *Philosophical Magazine* and in the Royal Society proceedings. Griess was unable to analyse his organic " unknowns " so he sent samples regularly in small packets to Dr. Schmidt of Dresden, while " at the same time a welcome accompaniment took the form of barrels of Allsopp's finest Pale Ale." It is safe to say that no comparable payment for analyses has ever been recorded in chemical history !

Cosmetics in sepia

A FEATURE of the American way of life is the enthusiasm with which it is publicised. Almost every aspect of human behaviour is studied and analysed at some time or another and this is particularly true of market surveys. One of the latest surveys concerns the Negro cosmetic market. A sample survey in the south—in Memphis—showed that Negroes accounted for 39% of the total population and spent more than $400 million a year on cosmetics.

Similar statistics for this country would be helpful to manufacturers wishing to serve the increasing coloured population.

Some leading cosmetic firms have expressed the view that although they do not specialise in Negro cosmetics some of their darker toned preparations could be used equally well by white and coloured women. This may be true of the not-so-dark skinned types, but it is improbable that any really dark-skinned woman would be able to use even the deepest sun-tan shade without looking slightly ludicrous.

A manufacturer who also runs one of the two beauty salons in London which cater exclusively to coloured clientèle tells us that there is no difference in the type of ingredients used, but the range of shades must necessarily be wider. Lipsticks too need no special ingredients, but dark shades are obviously most suitable. Lemon-based creams are very popular, probably because of their bleaching properties. Skin textures, he finds, vary as with white skins, but this view is not completely shared by some American cosmeticians, who find Negro skins have a tendency towards dryness.

British cosmetic manufacturers might well take more notice of the special needs of Negroes. With a good home market in which to market-test their goods, they stand an excellent chance of increasing exports to tropical and semi-tropical countries.

More about fluoridation

IN THIS country fluoridation of water to prevent tooth decay is still experimental and controversial; in Andover, one of the test areas, the legality of fluoridation is to be challenged in the courts. But in the United States it is an accepted public health measure and is in operation in 1,487 communities with a total population of 30 million. Exemplifying the care with which fluoridation trials have been conducted in the U.S. is the report of a 10 year trial at Grand Rapids and Muskegon, Michigan. The period of 10 years was selected so that observations would be comparable to those obtained in the basic epidemiological studies on children up to 14 years of age, with a continuous history of using fluoridated water. Since 1945 sodium fluoride has been added to the water supply of Grand Rapids, the principal study area. Since that time the fluoride content of the water supply has been maintained at a level of 1 p.p.m. The water supply at Muskegon, the control area, contained less than 0·2 p.p.m. of fluoride until July 1951. At that time Muskegon began adding fluoride to its water supply to a level similar to that in Grand Rapids. To establish the caries status of the study population before fluoridation of the waters complete oral examination with a mouth mirror and explorer was made of virtually all children enrolled in elementary and secondary schools in Grand Rapids and Muskegon in 1944 and 1945. Each year therafter, similar examinations were made of selected samples of children in the two areas. To provide an "expectancy curve" complete oral examinations were also made in 1945 and 1946 of school children in Aurora, Illinois, where the water supply has contained 1·2 p.p.m. fluoride from natural sources for about 50 years.

The results showed a striking reduction in the amount of dental decay in both the deciduous and permanent teeth—a reduction of about 54%. Before the decision to add fluorine to the water supply at Grand Rapids, it was concluded that the procedure would not produce an undesirable cosmetic effect such as mottled teeth.

Crop spray problems

AN IMPORTANT contribution on the hazards from crop spraying has recently been made by Sir Solly Zuckerman, of the University of Birmingham, who was the first chairman of the Interdepartmental Committee set up by the Government to advise on the risks to the consumer and operator which arise from the use of toxic substances on agricultural products, and in the storage of food, and also on the risks to wild life. In the more advanced countries, chemical weedkillers, fungicides, insecticides and rodenticides are all part of an array of scientific practices whose purpose is to increase crop yields. However, chemicals are no substitute for good husbandry. Until about 1940, the toxic substances used to protect growing crops were mainly compounds containing lead, arsenic or copper. Working limits for residues in harvested crops and fruit have been agreed for arsenic and lead, and in the case of a few specified foods, for copper, and none of these substances constitutes a major problem to the analyst. Controlling their use is therefore essentially an administrative problem. It is the substances introduced since about 1940 that create the real problem. These include a variety of halogenated compounds of which the better known are DDT, BHC, dieldrin and endrin, and a number of organo-phosphorous compounds. There are also the nitrophenol compounds such as DNC, and plant products like nicotine and derris.

Providing they are properly used, some crop protecting substances possess chemical properties which give all the necessary assurance that they could not be present as residues on harvested crops. There is now little danger to the public arising from the use of such crop-protecting chemicals as the fungicides that are used to dress wheat-seed, or the selective weedkillers with which wheat is often sprayed well before it is due to be harvested. In the United States DDT, which is used in dairy farming, has been found in abnormally high amounts in milk and body fat.

Prof. Zuckerman states that the position is somewhat dangerous in the case of seasonal fruit and vegetable crops such as strawberries, brussels sprouts and hops. These are the crops to which the systemic and contact organo-phosphorous insecticides are normally applied. Such chemical preparations constitute a hazard, since they may be left as residues in food. Methyl bromide, which is applied to stored wheat, may also destroy an essential food factor. The Pure Food and Drugs Administration of the U.S. demands that a firm proposing to sell a new chemical for spraying purposes should be responsible for providing adequate information about chemical analysis and toxicity. Many manufacturers in this country do not possess adequate facilities for obtaining this data about the materials they produce. Government Departments must depend on the goodwill of the firm concerned for information about new preparations.

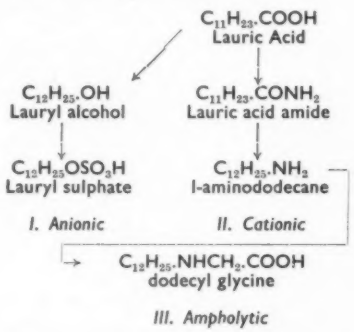
Germicidal Ampholytic Surface-Active Agents

By Dr.-Ing Adolf Schmitz* and W. Sim Harris, F.C.S.†

In this article the authors outline the evolution of ampholytic surface-active agents, compare them with cationic surface-active agents and comment upon the increased bactericidal activity of ampholytic surface-active compounds resulting from increase in number of nitrogen groups in the molecule.

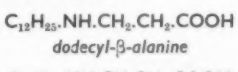
THE synthetic electrolytically dissociated surface-active substances can be classified into three groups depending upon the electrical charge of the ion containing the lipophilic residue of the molecule, the charge of which can be positive, negative or simultaneously positive and negative.

The three types may be regarded as chemical variations of natural fatty acids, and taking the derivatives of lauric acid as an example we can represent the development of the three types as follows:

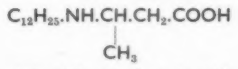


The anionic compounds have hitherto had the widest technical application, although in the last two decades the cationic compounds, especially in the form of quaternary ammonium compounds, have replaced the anionic compounds for certain uses until, currently, the annual production in the U.S.A. alone is estimated at around 5-8 million lb. The ampholytic compounds have been known theoretically for many years, but it is only within the last decade that their wide field of application has been determined and recognised.

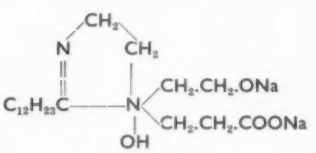
McCutcheon drew attention to their practical value and importance at the first International Congress for Surface Activity held in Paris in 1954,[1] taking as his example *dodecyl-β-alanine*. This compound was introduced to the market under the name *Deriphat* by General Mills, and another product of the same homologous series *dodecyl-β-aminobutyric acid* is manufactured by Armour and Co. as *Armeen Z* and by P. R. Masek (Research Laboratories) Ltd. in association with aminosulphonic acid, as *Desil*, Both these ampholytic compounds contain only one nitrogen group in their surface-active ion, whereas the amino acid *Miranol*, produced by the Miranol Chemical Inc., contains the imidazol ring and, thus, two nitrogen groups.



dodecyl-β-alanine

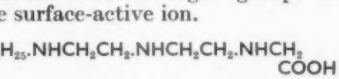


dodecyl-β-aminobutyric acid



Miranol

The ampholytic compound *dodecyl-di(aminoethyl)-glycine* marketed in 1950 by the German firm Th. Goldschmidt A.G., and which is present in their *Tego* disinfectants, contains three nitrogen groups in the surface-active ion.



dodecyl-di(aminoethyl)-glycine

The effect which the increase in number of nitrogen groups in the surface-active ion has on the bactericidal activity of a compound is referred to later.

Relation of surface-activity to disinfection

The modern concept of a disinfectant agent recognises the importance of surface-activity in addition to bactericidal efficiency. This was clearly shown in an article in 1956 by Moore and Hardwick on "Germicides Based on Surface-active Agents"[2] in which the combination of anionic, cationic or non-ionic surface-active agents, with phenolic compounds or iodine, are studied. No mention, however, was made of ampholytic surface-active agents in this article, whereas, in the following year, R. L. Smith, writing on "The Changing Scene in Surface-active Agents,"[3] fully recognises their importance as, indeed, R. Neu[4] and C. A. Lawrence[5] had done before him. It is therefore pertinent to enquire at this point into the real differences which exist between the ampholytic and other surface-active agents.

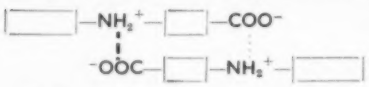
A common property of the higher molecular weight amino acids is the pronounced tendency to form micelles in aqueous solution. We have observed that even dilute solutions of these compounds attain their maximum surface-activity. The critical micelle concentration, *i.e.* the concentration at which the lowest value of surface tension of the aqueous solution exists as measured with the stalagmometer, was found to be 0·2-0·4 g./litre; whereas the values for comparable anionic or cationic surface-active compounds were between 1 and 2 g./litre. The critical micelle concentration of amino acids would appear to be dependent upon the *p*H of the solution and we have observed that it increases in the acid *p*H range.

This apparently specific characteristic of the higher molecular weight amino acids may be a function of their dipolar character and additionally to the normal

* Chief Chemist, Pharmaceutical Research Laboratories, Th. Goldschmidt A.G., Essen.

† Governing Director, Hough, Hoseason and Co. Ltd., Manchester.

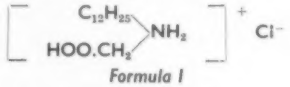
association of surface-active compounds they may also form aggregates by desaturation of their charges in the following manner:



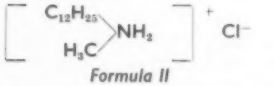
This behaviour is certainly an important integral part of the detergent characteristics of the higher molecular weight ampholytes which has already been indicated by McCutcheon[1] and Smith.[2]

Bactericidal acitivity

In all the ampholytic surface-active agents mentioned above the surface-activity is accompanied by a germicidal effect, the activity of which is dependent on the *p*H of their aqueous solutions, *viz.* on the distribution of the anions, cations and zwitterions in solution. Structure of the molecule and the number of nitrogen groups present also play significant rôles in the germicidal efficiency. It is not surprising that the hydrochloride of *dodecylglycine* (*Formula I*) has a similar bactericidal activity to that of the hydrochloride of *dodecylmethylamine* (*Formula II*).



Formula I

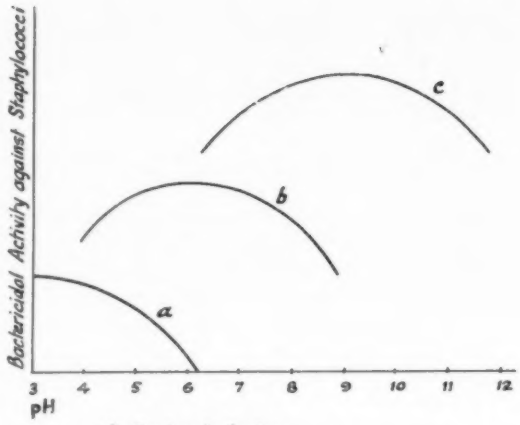


Formula II

The bactericidal activity of compounds similar to Formula II have been known for many years and we have found similar, though somewhat lower, bactericidal activity for compounds of Formula I. In making an extensive study of these compounds, however, it was observed that their bactericidal activity was greatly increased by the introduction of further nitrogen groups, as shown in Table 1.

The aqueous solutions of the three compounds have different *p*H values and it was important to eliminate the possibility that the increased bactericidal activity was attributable entirely to the change in *p*H. The bactericidal activity against *staphylococci* of the three compounds at different *p*H values is shown schematically in Fig. 1.

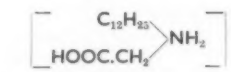
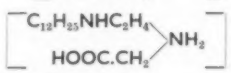
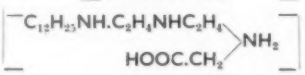
Clearly the introduction of nitrogen groups caused an increase in the *p*H value of the optimum bactericidal activity which was accompanied by a true increase in bactericidal activity. From this graph we may also deduce that suitable mixtures of ampholytes may extend the range of high bactericidal activity over a wide *p*H scale.



a) Dodecyl glycine
b) Dodecyl-aminoethyl glycine
c) Dodecyl-di(aminoethyl) glycine

Fig. 1.

Table 1

Formula	Conc. %	Time to kill staphylococci (mins.)
	0·05	10
	0·05	5
	0·05	1

Comparisons with quaternary ammonium compounds

A compound such as dodecyl-di-(aminoethyl)-glycine, which for convenience we may name *dodicin*, differs markedly from the simple amines or quaternary ammonium compounds (*quats*), both chemically and in microbiological activity. Experiments in which the bactericidal activity of solutions at different *p*H values have been compared with the degree of precipitation of proteins of these solutions have shown a fundamental difference between *dodicin* and a quat such as *dodecyl dimethyl benzyl ammonium chloride*.

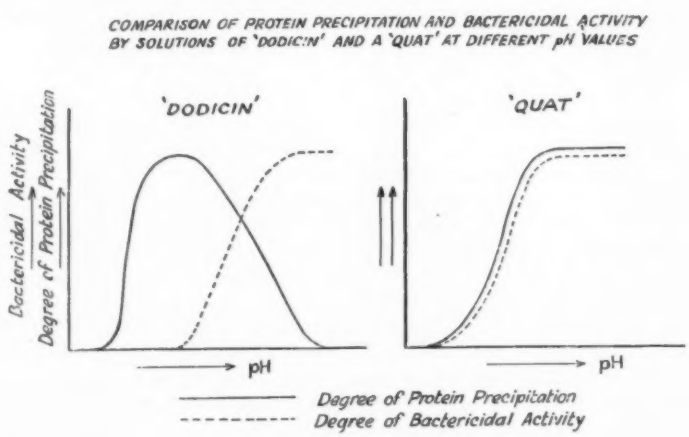

COMPARISON OF PROTEIN PRECIPITATION AND BACTERICIDAL ACTIVITY BY SOLUTIONS OF 'DODICIN' AND A 'QUAT' AT DIFFERENT pH VALUES
'DODICIN'
'QUAT'
Bactericidal Activity
Degree of Protein Precipitation
pH
pH
Degree of Protein Precipitation
Degree of Bactericidal Activity

Fig. 2.

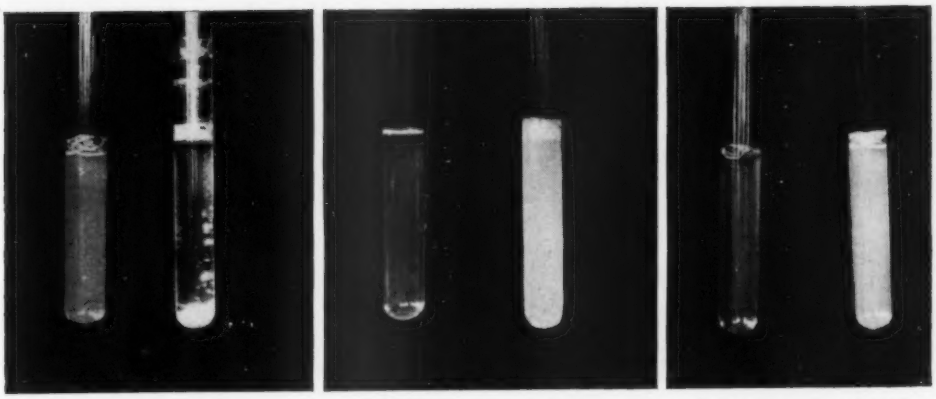


Plate 1. Comparison in protein precipitation.

Fig. 2 shows that for the *quat* the increase in degree of protein precipitation with increase in *p*H of the solution was closely paralleled by the bactericidal activity. On the other hand *dodicin* precipitated the protein at low *p*H values but not at *p*H9 when the bactericidal activity was at a maximum corresponding with the isoelectric point of the compound when the zwitterions are predominantly present.

$C_{12}H_{23}NH_2^+.C_2H_4NH_2^+.C_2H_4NH_2^+.CH_2COO^-$

Zwitterion

A comparison in protein precipitation was made between *dodicin* and *cetrimide* using as protein bovine serum albumin. Dilutions of 1:200, 1:300 and 1:400 were made from 10% solutions of the surface-active agents. To 20 ml. of each dilution 1 ml. of 20% bovine serum albumin was added, the solutions mixed and allowed to stand at room temperature. The results are shown in Plate 1, from which it is seen that the turbidity obtained with the *cetrimide* at 1:400, and resulting in flocculation in 1:200, is in marked contrast with the clear solutions obtained with *dodicin* at 1:400 and 1:300 with only slight turbidity at 1:200. Increased concentrations of *dodicin* gave more turbid solutions, but always less precipitation occurred with the ampholyte than with the quat. Such clear differences were not always shown with all protein solutions but, in general, the precipitation by *dodicin* was always less than by the *quat*.

The above experiment suggests that the mode of action of *dodicin* on bacteria may well differ from that of the *quats*, and it is indeed notable that *dodicin*, compared with *quats*, is effective against all micro-organisms, bacteria (including *Mycobact. tuberculosis*), fungi and spores.

Of the differences which have been observed between *dodicin* and all other surface-active agents, one of major practical importance is the bactericidal activity of *dodicin* against *Mycobact. tuberculosis*. It has been observed that a 0·1-0·2% solution of *dodicin* killed a suspension of tubercle bacilli in 10 min. This was of particular interest since the *quats* do not possess this activity whereas it is present in *dodicin* over a wide *p*H range. It appeared to be immaterial whether the anion, zwitterion or cation were in preponderance, and hence it becomes possible with *dodicin* to kill tubercle bacilli at a neutral or slightly acid *p*H which has, in general practice, hitherto only been achieved by a strongly alkaline phenolic solution.

In addition to possessing bactericidal activity *dodicin* is fungicidal. Plate 2 shows the results of incubation at room temperature for 28 days of malt agar slopes on which

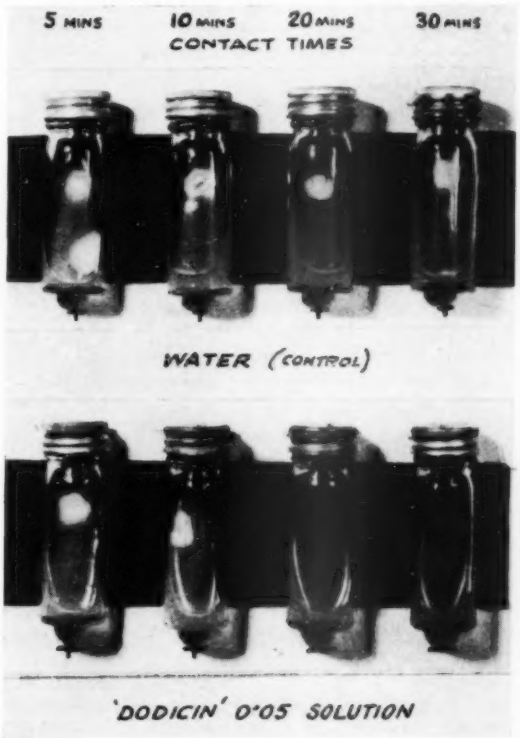


Plate 2. Fungicidal activity of dodicin; effects against T. mentagrophytes.

were placed segments of agar covered with a confluent growth of *T. mentagrophytes* which, before subculture, had been treated with 0·05% solution of *dodicin* for various times. It can be seen that the time taken for the *dodicin* solution to kill the fungus at room temperature was 10-20 min.

Low toxicity

Whilst it is clearly important that a modern disinfectant must possess versatility in bactericidal and fungicidal activity, low toxicity is also an essential requirement, and an important advance in this characteristic was attained with the introduction of the *quats* as disinfectant agents. In general, their fatal dose when administered orally to rats is around 0·2-0·5 g./kg. body weight. The corresponding values for *dodicin* are between 3 and 4 g./kg. body weight or approximately ten times less toxic than the *quats*.

Dodicin possesses other characteristic properties such as being odourless, stable, non-corrosive to metal, wood and other materials and is also inherently deodorant. It is adsorbed on to both living and inanimate surfaces leaving thereon a very thin, imperceptible, but bactericidally-active film. Since the disinfection of receptacles, plant and other equipment of, for example, food manufacture, now presents an important field of use, extensive trials and experiments have been carried out to determine the quantity of *dodicin* adsorbed on to such surfaces. Thus it has been determined that after treatment of a 500 ml. milk bottle and 20 litre milk can with a 0·1% solution of *dodicin* and subsequently rinsed with water, the quantity of *dodicin* remaining on the internal surface of the bottle and can was 0·092 and 0·85 mg. respectively. Should these amounts become totally dissolved in the milk to be contained in these vessels the maximum concentrations of *dodicin* in the milk would lie between 0·05 mg. and 0·2 mg./litre, or well within the permitted tolerances for trace elements such as arsenic, lead, antimony and chromium.

Bacteriostatic/bactericidal ranges

The *quats* possess a bacterio*static* range far exceeding their bacteri*cidal* range. In the case of *dodicin* this does not apply, the two ranges approximating one another. In many laboratory methods of testing for antibacterial effect, bacteriostasis is measured, leading to erroneous results, since it is the bactericidal activity which is the all-important requirement in the adequate disinfection and sterilisation of surfaces. Such methods of laboratory testing wrongly indicate the *quats* as possessing much higher activity than the ampholytes, whereas in practical conditions of use the reverse is true. The practical use of a bactericidal agent at dilutions in the bacteriostatic range is obviously undesirable.

The foregoing comparisons, together with other findings, indicate that in *dodicin*-type ampholytic surface-active compounds[6] a new range of antibacterial agents has been discovered the full impact of which has yet to be realised, although they have been widely, and are increasingly, used in many fields of practical disinfection over the past several years in Germany and other European countries with remarkable success. More recently, over the last two or three years, these new compounds have been comprehensively and authoritatively tested in Great Britain both in the laboratory and in practical fields of disinfection and sterilisation where their outstanding properties have been fully substantiated.

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3. MANUFACTURING CHEMIST, 1957, **28**, (6), 281-4.
4. MANUFACTURING CHEMIST, 1954, **25**, (1), 10-11.
5. *S.P.C.*, 1954, **27**.
6. "Dodicin-type" bactericidal ampholytic surface-active compounds are presented commercially under the trade name of TEGO by Th. Goldschmidt A.G., Essen. (U.K. Hough, Hoseason & Co. Ltd., Manchester 19).

B.S. 2915: 1957 Domed metallic bursting discs and bursting disc assemblies deals with bursting disc assemblies in which a circular disc of ductile metal foil is gripped uniformly round the periphery and is caused to bulge by fluid pressure so that it assumes a spheroidal shape. In forming the bulge, the metal of the disc is stretched and thinned increasingly towards the centre, and when a predetermined pressure is reached the disc bursts by tearing from the centre. Copies of the standard are available from the British Standards Institution, 2 Park Street, London, W.1. Price 6s.

COSMETIC COLOURS

D. F. Anstead, B.SC., A.R.I.C. spoke on the subject "Pigments, Lakes and Dyestuffs in Cosmetics" at a recent meeting in London of the Society of Cosmetic Chemists of Great Britain.

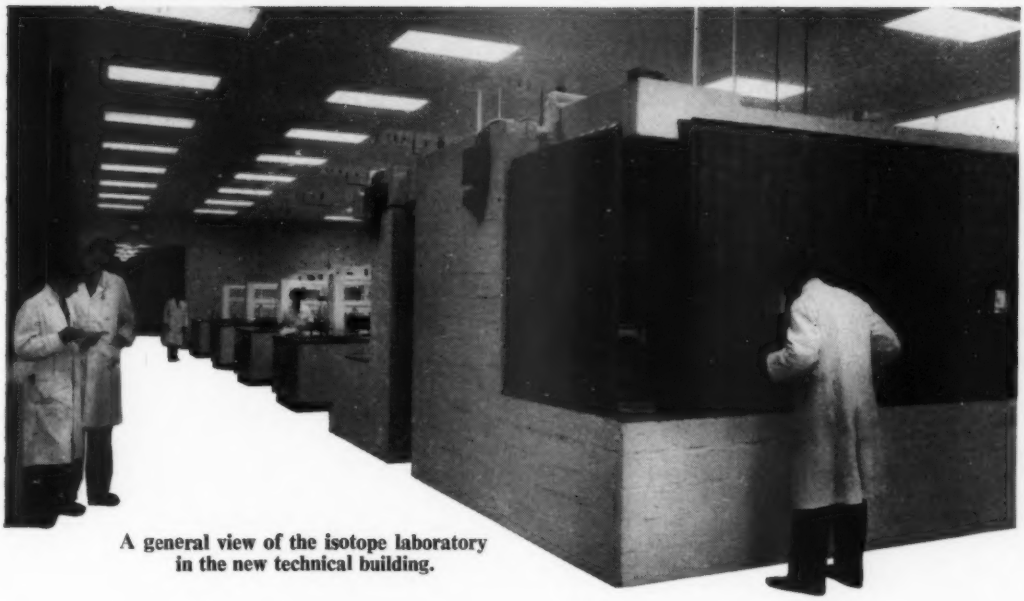
The lecturer confined himself to organic dyestuffs and pigments, the different types of which he defined and explained. The special properties of pigments such as light-fastness, tendency to "bleed" into oil or water and so on were discussed with reference to soap, bath crystals, face powders, lipsticks, foundation lotions and creams, cake make-up, nail varnish and preparations in oil, water or alcohol.

Not only does the method of manufacture modify the properties of the pigments, but other components present in the cosmetic product may play a part. Mere dilution may affect the light fastness of a colour; perfume may affect not only light-fastness but also tendency to "bleeding" and shade.

Difficulties encountered in colouring foundation creams and lotions and cake make-up can be eliminated when the pigment manufacturer makes up the colour in paste form in one of the basic media of the cosmetic. Again the processing together of coloured and white pigments for nail varnishes is best carried out at the stage of manufacture of the pigment, for only in this way can streaky white separation in the bottle be avoided.

The softness of texture and ease of dispersion of a pigment can change through alteration in particle size and formation of aggregates during filter-pressing and subsequent drying. Aggregates formed at this stage are not inevitably broken down during any subsequent grinding. A recent promising development in pigment manufacture is to provide the particles with a hydrophilic film for dispersion in water and with a hydrophobic film for dispersion in oil, aggregation being prevented.

A useful historical survey of legislation affecting the use of colours in cosmetic products in Canada and the United States followed and the hope was expressed that the Toilet Preparations Federation would consider specifications for colours and introduce a list of permitted colours common to the permitted lists of as many countries as possible.



A general view of the isotope laboratory in the new technical building.

Radiochemical Centre Enlarged

Increased Production of Radioactive Pharmaceuticals

Two new buildings—a laboratory and a block of offices—have been opened at the Radiochemical Centre, Amersham, Bucks. These new facilities considerably increase the capacity of the centre for processing radioisotopes and manufacturing radioactive chemicals. Important among the latter are special pharmaceuticals, the newest of which is cobalt-labelled vitamin B_{12}.

DEMAND for the radioactive products of the Radiochemical Centre has trebled in the past three years, so the new buildings, which were inaugurated on November 1 by the Marquess of Salisbury, will meet an acute need for increased capacity.

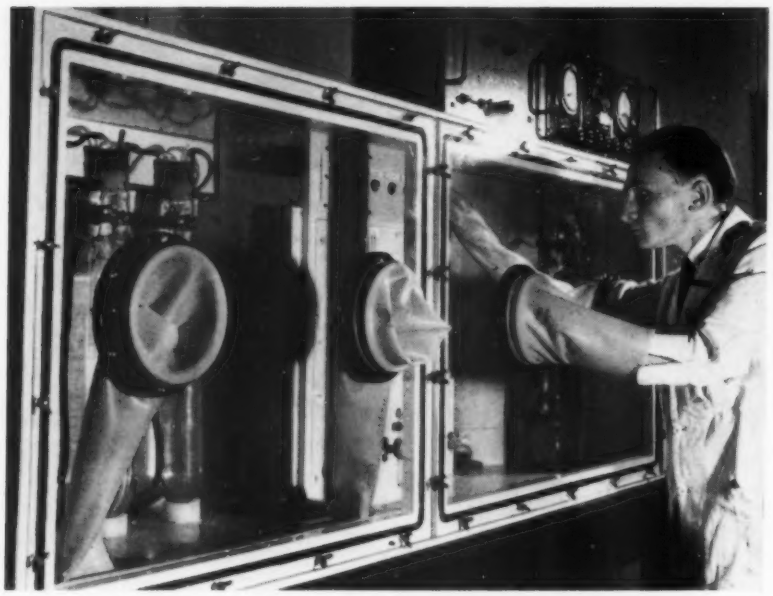
The laboratory, which is a single-storey building of 12,000 sq. ft., is the second part of a group of buildings specially designed for processing radioisotopes, of which the first was commissioned in April 1954. It will accommodate the same type of work: that is, the separation of pure radioactive isotopes from materials irradiated in the Authority's reactors, the synthesis of "labelled" compounds for research, and the manufacture of radiation sources for industrial and medical use. The scale of radioactive operations will be about 100 times greater than previously.

The standards of radiological safety and control of radioactive contamination within the laboratory building are substantially higher than has been possible hitherto in this type of work, and conform to the most recent international recommendations. The laboratory is equipped with many special vacuum cabinets and much remote control equipment for handling radioactive substances. A group of "hot cells" is under construction which will allow handling of isotopes such as radiocæsium, emitting penetrating radiation up to 1,000 curies of activity. The cells are totally enclosed, shielded by some 300 tons of high-density concrete, and equipped with the latest master-slave manipulators of British manufacture.

The administrative building is an area of 15,000 sq. ft. The first floor houses the commercial department, which now deals annually with some 18,000 consignments of radioisotopes exceeding £400,000 in sales value. Over 70% of this total is exported and the products go to some 50 different countries throughout the world, mostly by air from London Airport. The ground floor of this building provides improved personnel facilities for the staff of 200.

Both buildings have structural steel frames, and in the laboratory part of the curtain wall cladding is demountable to admit large equipment. They have been designed to meet the Centre's technical requirements by J. Douglass Mathews and Partners. The main contractors were James Longley and Co. Ltd. Construction was completed in 15 months and the buildings with their engineering services cost approximately £200,000.

The four smaller laboratories which were opened by Sir Henry



Apparatus for the growth of Chlorella vulgaris with Carbon-14.

Dale in April 1954 were the first in this country designed specifically to house isotope production processes; hitherto, the work had been done in more or less conventional laboratories with improvised equipment. The plants installed at that time have continued to work satisfactorily, producing in simple form such basic isotopes as iodine-131, phosphorus-32, sulphur-35 and carbon-14. The scale of production has generally increased to between two and three times the 1954 level, and there have been substantial improvements in the quality of the products. For example, the best carbon-14 made recently has been nearly 50% isotopic abundance as compared with less than 2% three years ago. The dispensary now deals with up to 100 consignments a day, each being prepared specially to meet the particular prescription of medical users in many parts of the world. In these three years some 30,000 dispensings have been made.

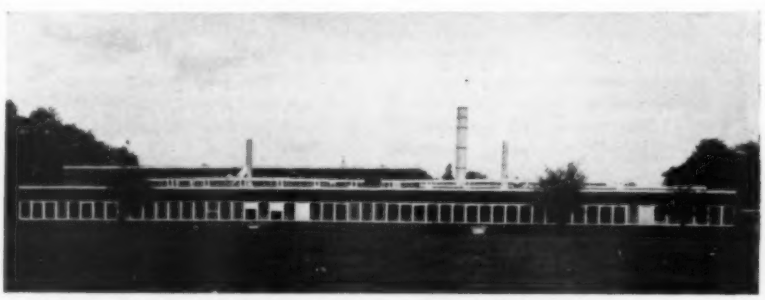
A larger laboratory to house these processes with *beta* emitting isotopes is necessary because of the increasing radioactive scale of operations, the greater diversity of work and the higher standards of protection that are now in vogue. The older plants were adequately shielded for amounts of gamma emitters up to about 10 curies, but the present need is for equipment capable of handling up to 1,000 curies. At this level the radiations scattered back from the ceilings become an important factor, and heavy top shielding is necessary. The new plants have been designed to conform with the recent recommendations made by the Medical Research Council and the International Committee on Radiological Protection.

The general principles behind the design of this new radiochemical laboratory are much the same as previously, but there are improvements in technique. The radioactive materials are strictly localised by being contained in vacuum cabinets with adequate shielding. To accommodate these units, there are two large open working areas which are provided with the usual services in modular groups at high level, a high standard of general ventilation and a separate drainage system to dispose of radioactive effluent. One of the areas is sufficiently large to accommodate a 3-ton gantry for handling heavy shielding and isotope containers. Ancillary rooms are provided for inactive or tracer level work.

"Hot caves"

The facilities for processing fission products at Amersham are being improved. Cæsium-137 and strontium-90 have to be manufactured into the various special forms required by industry, as, for example, for industrial radiography. There is also need for producing increased quantities of the "minor" fission products—promethium, cerium-144, yttrium-91, zirconium and niobium-95, etc. For these purposes a "hot cave" facility is being constructed and is about half complete. It comprises three interconnecting compartments which can accommodate activities up to 1,000 curies of cæsium-137. The shielding is 3-ft. of high density (155 lb. per cu. ft.) concrete bricks, vision is through windows containing concentrated zinc bromide solution, and for manipulation within the cells three pairs of the Argonne pattern of master-slave manipulators are being installed. These caves are intended for chemical work with highly toxic materials and it has therefore been necessary to provide them with enclosed metal liners, each measuring about 7 ft. × 8 ft. × 15 ft., which will be kept under slightly reduced pressure to prevent the escape of radioactive dust. This is the first time in this country, or elsewhere so far as is known, that these manipulators have been used for this class of work within caves which are not only fully shielded but completely enclosed. Access to the caves when servicing is necessary will be made by the "captive man suit" technique.

The demand for some of the less



South side of the new technical laboratory.

Left: Iodinated human serum albumin production—Aseptic glove box manipulation. Right: Continuous recording of activity on paper chromatogram strip.

common isotopes, and particularly for labelled compounds containing I-131, P-32 or S-35, has now grown sufficiently to warrant formal chemical plants for producing them —as happened with the simple primary isotopes three years ago. The problem of housing these processes economically and safely is a difficult one, because of their diversity and the constantly changing demand. The number of separate syntheses of labelled compounds (other than C-14) has risen from some 200 in 1954 to more than 500 this year, and these incorporate some 20 different isotopes. This reflects an increasing appreciation of the value of tracer compounds in chemical technology, particularly in the study of such specific chemicals as weed-killers, pesticides, fertilisers, rubber additives and detergents. The use of labelled drugs for determining their mode of action and metabolic fate, and of special compounds as diagnostic aids, is also increasing steadily.

To provide for this type of radiochemical work, a system of standard boxes for working with fixed gloves or tongs is being installed. The boxes are transportable and interchangeable, they can be connected together to form larger units, and when in use they are tethered to the service mains by flexible connections. The transfer of processes from the more conventional laboratory fume hoods to this new system is necessarily protracted, as each one has to be specially devised and equipped, but some with sulphur-35 are already in operation.

Labelled chemicals

In researches by the radioactive tracer method carbon-14 remains pre-eminent and there is a buoyant demand for compounds labelled with this isotope, particularly from biochemists. As all compounds have to be derived from radioactive carbon dioxide, the primary source of carbon-14, much effort is devoted to the synthesis of compounds by chemical methods. This section has added more than 100 new compounds to the Centre's list during the past three years. The synthesis of generally labelled benzene and toluene has been much improved, thus making available several of the simpler aromatic substances (benzene, toluene, phenol, aniline, chlorobenzene, benzoic acid). Other classes of compound which have recently become available include the steroids (chloresterol, testosterone, progesterone, œstrone), the carcinogens dibenzanthracene and benzanthracene, specifically labelled sugars (glucose labelled in the 1, 2 or 6 position, ribose, sorbitol, gluconic acid and glucuronic acid), and several of the amino acids specifically labelled (DL-tryptophane, 5-hydroxytryptamine and 5 - hydroxytryptophane, L-histidine and L-serine).

Standards as applied to labelled compounds are constantly improving. Specific activities are now commonly 5 to 10 millicuries per millimole compared with 1 to 2 millicuries per millimole three years ago, and they may be much higher in exceptional cases. The technique of gas phase chromatography has done much to improve chemical purities. And in general the standard of purity which is now expected in labelled compounds is much higher than with inactive chemical reagents; radiochemical impurities amounting to only one part in 10,000 can be significant

to a discriminating user. In some cases the limit of radiochemical purity is now set by the susceptibility of a compound to decomposition under the influence of its own radiation. Techniques for minimising this effect are being studied.

Special pharmaceuticals

Biochemical methods are becoming increasingly important in the synthesis of labelled compounds, and a section is now devoted to this work and to making certain special pharmaceutical products. The scale of production of generally labelled sugars by photosynthesis in green leaves and of protein by growing the alga *Chlorella vulgaris* has increased some 10 times. It is not exceptional to use a curie of carbon-14 in a single batch. This larger scale of working has led to improved stocks and quality of the generally labelled amino acids, and to useful quantities of certain minor components such as the nucleic acid fractions and certain lipids.

Human serum albumin iodinated with iodine-131 has been in regular production at Amersham since January 1955 and this is finding increasing application in diagnostic procedures, such as the measurement of blood volumes and cardiac efficiencies. Recently considerable interest has arisen in its therapeutic possibilities. This product is manufactured under the Therapeutic Substances Act, using albumin supplied by the Lister Institute. Another compound of considerable medical interest is vitamin B_{12}, which can be labelled with one or other of the cobalt isotopes—cobalt-56, cobalt-58 or cobalt-60. A process suitable for the manufacture of radioactively labelled B_{12} has been devised with the co-operation of Glaxo Laboratories and the first product labelled with cobalt-58 will be available shortly.

Natural radioelements

Notwithstanding the great variety and quantity of isotopes now produced artificially, the demand for products of the natural radioelements has not declined. During the past three years the Natural Radioelements Department has manufactured about 8,000 clinical radium needles and 120,000 radon seeds — mainly for British hospitals, but partly exported. The production lines for filling radium containers, for medical and industrial purposes, have been entirely rebuilt so that all manipulations are done remotely and the work is totally enclosed—a difficult enterprise with this fine work. A new plant has also been installed for producing polonium-beryllium neutron sources which are now in demand industrially for well-logging and for reactor experimentation. These may contain 5 to 10 curies of polonium per source.

For beta emitters which are to be used clinically or industrially, the preferred form is in metal foils or plaques. These are now produced with a number of different isotopes — strontium-90, thallium-204, cerium-144, ruthenium-106 — according to the beta ray spectrum required for particular applications. Some 8,000 sources of this kind have been manufactured during the past three years, mainly for thickness gauges and static eliminators. Improved manufacturing techniques have made it possible to handle much larger quantities of beta emitters in this way, and a radiating unit containing 10 curies of strontium-90 has recently been made for therapeutic use. Special applicators are also made to fit in contact with the eye, and these are coming into use for improving corneal grafts and treating certain disorders of the eye.

The Radiochemical Centre, which is part of the Research Group of the United Kingdom Atomic Energy Authority, is under the general direction of Sir John Cockcroft, F.R.S. The General Manager is Dr. W. P. Grove.

Inoculation of Streptomyces culture for vitamin B_{12} production.

COSMETIC ANTIOXIDANT

Cosmetics which contain substantial amounts of vegetable oils and other fatty materials often develop a rancid odour shortly after the container has been opened for the first time. The addition of a preservative is not always effective.

An antioxidant mixture based on the butylated phenols has been developed by A. Ruys (*Schimmel Briefs*, No. 269). Known as Antracone 20, the formula is as follows:

	%
Butylated hydroxyanisole ..	10
Dodecyl gallate	6
Citric acid	4
Hexylene glycol	70

Tests on avocado (0·4% added to the oil) have shown it to be an unusually effective stabiliser for vegetable oils. The improvement was less marked in emulsions containing the stabilised avocado oil, since antioxidants are normally less effective in emulsions than in dry fats. Antioxidants of low oil solubility tend to migrate to the aqueous phase of emulsions. All the antioxidants in Antracone 20 are quite soluble in oils, however.

Behaviour of a Commercial Anti-Odorant in Respect of Four Odorous Irritants

By R. W. Moncrieff, B.SC., F.R.I.C.

The effect of a commercial anti-odorant on olfactory, trigeminal and ocular irritation is studied and it is shown that its action is confined to reduction of the *olfactory* sensation. The use of the anti-odorant combined with the technique of progressive reduction of concentration of an odorous irritant in air by passing it through an adsorbent affords a method of separating olfactory from trigeminal and ocular irritation.

ODOUR counteraction may appear to afford a method of separating, in part at least, true odour from irritant action. It has long been known that two or more odorous substances may mutually reduce their ease of perception so far as odour is concerned, but not, so far as is known, as concerns irritant action. Aronsohn[1] (1886) noted that the smell of camphor was reduced by the smell of Cologne water or of oil of juniper. Zwaardemaker[2] (1895, 1898) recorded the following pairs of counteracting odorants:

Cedarwood and rubber
Wax and rubber
Wax and balsam of Tolu
Paraffin and rubber
Rubber and balsam of Tolu.

Backman[3] (1917) observed that the odours of benzene, toluene, xylene, durene and *pseudo*-cumene, although additive in great dilution, were often counteracting in higher concentrations, and that with certain definite proportions of two or more members compensation effects of practically no resultant odour could be obtained.

The advent of the synthetic resins and plastics has raised new problems of unwanted odours and many descriptions can be found in the patent literature of methods whereby their odours can be reduced. But most, if not all, of these instances of odour reduction have been of specific application to one odour or to a small group of closely related odours.

Since the war, however, there has appeared on the market a type of product usually described as an air freshener or as an anti-odorant.

The air freshener used in the work described in this paper was "Air-wick," a product which has been on the market for 15 years and which has gained wide acceptance for use in kitchens, living rooms and bathrooms and has, too, been found of considerable use in industry.

The author acquired first-hand experience of its effectiveness some years ago when carrying out pilot trials with a fire-foam which was essentially a protein hydrolysate; this material had a revolting smell but the proximity of "Air-wick" did a great deal to mitigate the unpleasantness and to make working conditions tolerable.

Essentially, "Air-wick" consists of a very finely divided emulsion of odorant materials, most of which are oils, in an aqueous solution of sodium copper chlorophyllin. These odorant materials have been chosen to reduce those unpleasant odours that are commonly met with, such as stale kitchen smells, for example, cooking cabbage, and the furfuryl mercaptan in coffee residues, and, as well, fæcal odours which are due largely to their skatol and mercaptan contents. The air freshener has been built up empirically on the basis of finding suitable odours to reduce such kitchen and bathroom smells, and of combining these counteracting odorants in such proportions that the whole product has an unobtrusive and mildly pleasant smell. The number of odorants that "Air-wick" contains is very considerable, and it will reduce the intensity not only of nauseous smells but also of unwanted odours such as of paint or of onions. The mechanism of odour counteraction has not yet been thoroughly worked out; Dyson[4] (1938) has attributed odour-cancellation to interference between dominant frequencies in the Raman spectra of two odorants, and there have been other suggestions.

It has been shown by the author[5] (Moncrieff, 1954) that there is no anæsthetic action involved in the use of "Air-wick." Quite recently new and convincing evidence [6] that anæsthesia is not involved in this mechanism of odour-reduction has come from depth encephalography (Sem-Jacobsen *et al.*, 1956). With an electrode implanted through the skull in the olfactory bulb of a conscious person, they were able to record the electric responses in the bulb when the person was smelling something. They found that "the electric response in the olfactory bulb appeared promptly when the stimulus of odour was applied to the nasal mucosa and disappeared rapidly when the stimulus was removed. The response occasionally would persist for a considerable length of time. Thus the response in a patient showing good reaction to stimulation by means of her favourite perfume was so prolonged that the test had to be terminated. An attempt was made on one occasion to deodorise the laboratory with a commercial deodorant. The electric responses evoked by this deodorant were so persistent that further testing was impossible for the rest of the day." Quite evidently there is no sign of anæsthetisation. Moreover, when "Air-wick" is used as an anti-odorant the total odour intensity is lowered; it does not work by masking, a process which has been defined by McCord and Witheridge[7] (1949) as "the process of obliterating one odour by superimposing another to create a more compelling sensation, preferably pleasant." There is nothing "compelling" about the odours of the air fresheners that are marketed today; it is, for example, quite possible to smell a fresh rose if it is held to the nose at the same time as a bottle of "Air-wick." Useful anti-odorants have long been marketed and their effective-

ness is a matter of everyday experience, but a complete theory of odour-counteraction has still to come. They afford another example of the way in which practice may outrun theory for a time. Millions of tons of beautiful viscose rayon were made and used before anyone had an inkling of the fundamentals of fibre structure.

The adoption of "Air-wick" in the present series of experiments was dictated by its ability to diminish the intensity of many odours; it was not known whether it would diminish trigeminal and ocular irritation, but there was no evident reason to think that it would. If it would diminish odour and would not diminish trigeminal or ocular irritation, it would afford a useful means of disentangling these sensations.

Methods and apparatus

The apparatus which was used is shown in Fig. 1. A is a variable speed air-blower, B a Rotameter flow-meter to measure the velocity of the air, C is a bottle containing the odorous irritant, D is a second bottle containing the anti-odorant "Air-wick" and E is a glass tube of 0·5 cm.² internal section which contains a column of adsorbent of known height. Air was first blown over the odorous irritant in bottle C, then over the anti-odorant in bottle D, and finally up the adsorbent column E. The air-speed was gradually increased until the smell of the odorous irritant was just recognisable with certainty at the outlet of the tube E and similar observations were then made for the incidence of a tingling sensation in the nose and for eye irritation. Similar trials without the "Air-wick" bottle D had previously been made.

Results and discussion

Acetic anhydride. The bottle, C, contained 50 ml. acetic anhydride and the bottle, D, 50 ml. "Air-wick" fluid. The column, E, was packed with active carbon (Sutcliffe Speakman and Co. Ltd., 208 C, 6-8 mesh). The experimental results were as shown in Table 1.

The true smell of the acetic anhydride could not be detected in the presence of the anti-odorant at those air-speeds at which nasal irritation commenced, and if the air-speed was increased beyond this point the irritation became unbearable and the nose had to be

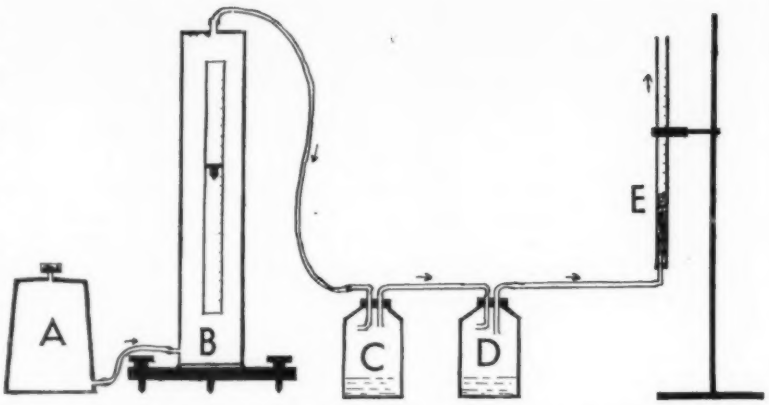


Fig. 1. Test apparatus. A—air blower; B—flowmeter; C—irritant; D—"Air-wick"; E—adsorbent.

Table 1.—Adsorption of Acetic Anhydride by Active Carbon in Presence of Anti-odorant

Height of column of active carbon (cm.)	*Air speed (c.c. per sec.) at which there could just be perceived:*			*Corresponding critical time (sec.) of contact of odorised air with active carbon to allow perception of:*		
	Smell of acetic anhydride	*Nasal irritation*	*Eye irritation*	*Smell of acetic anhydride*	*Nasal irritation*	*Eye irritation*
1·7	Smell of	22	10·5	—	0·039	0·081
2·6	Acetic	27	11	—	0·048	0·118
3·4	anhydride	33	14	—	0·052	0·121
3·8	could	35	18	—	0·054	0·105
4·6	not be perceived	40	19	—	0·058	0·121
Mean critical times of contact (sec.) ..				—	0·050	0·109

Table 2.—Adsorption of Acetic Anhydride by Active Carbon without Anti-odorant

Height of column of active carbon (cm.)	*Air speed (c.c. per sec.) at which there could just be perceived:*			*Corresponding critical time (sec.) of contact of odorised air with active carbon to allow perception of:*		
	Smell	*Nasal irritation*	*Eye irritation*	*Smell*	*Nasal irritation*	*Eye irritation*
1·8	12·5	16		0·072	0·056	
2·1	16	19		0·006	0·055	
2·4	16	22		0·075	0·055	
3·2	27	26		0·059	0·062	
3·7	27	40		0·069	0·046	
3·3			17·5			0·094
3·8			16·5			0·115
3·9			17			0·115
4·0			17·5			0·114
4·8			22			0·109
Mean critical times of contact (sec.) ..				0·068	0·055	0·109

Table 3.—Effect of Anti-odorant on Reactions to Acetic Anhydride

Air odorised with:	*Critical time of contact (sec.) of odorised air with adsorbent for:*		
	Smell of acetic anhydride	*Nasal irritation*	*Eye irritation*
Acetic anhydride ..	0·068	0·055	0·109
Acetic anhydride and "Air-wick" ..	Not detected	0·050	0·109

Table 4.—Adsorption of Formaldehyde by Active Carbon in Presence of Anti-odorant

Height of column of active carbon (cm.)	*Air speed (c.c. per sec.) at which there could just be perceived:*			*Corresponding critical time (sec.) of contact of odorised air with active carbon to allow perception of:*		
	Smell of formaldehyde	*Nasal irritation*	*Eye irritation*	*Smell of formaldehyde*	*Nasal irritation*	*Eye irritation*
2·1	Smell occasionally fleetingly perceived but not persistent	18·5	14	—	0·057	0·075
2·8		28	17	—	0·050	0·083
3·0		27	16	—	0·055	0·094
3·5		35	16	—	0·050	0·109
4·3		37	20	—	0·058	0·107
Mean critical times of contact (sec.) ..				—	0·054	0·094

Corresponding results in the absence of " Air-wick " were as shown in Table 5.

Table 5.—Adsorption of Formaldehyde by Active Carbon Without Anti-odorant

Height of column of active carbon (cm.)	*Air speed (c.c. per sec.) at which there could just be perceived:*			*Corresponding critical time (sec.) of contact of odorised air with active carbon to allow perception of:*		
	Smell	*Nasal irritation*	*Eye irritation*	*Smell*	*Nasal irritation*	*Eye irritation*
2·1	14·5	18	10·5	0·072	0·058	0·100
3·0	17·5	22	17	0·086	0·068	0·088
4·0	24	35	17·5	0·083	0·057	0·113
4·1	27	33	18	0·076	0·062	0·114
4·6	27	38	26	0·085	0·061	0·088
Mean critical times of contact (sec.) ..				0·080	0·061	0·101

Table 6.—Effect of Anti-odorant on Reactions to Formaldehyde

Air odorised with:	*Critical time of contact (sec.) of odorised air with adsorbent for:*		
	Smell of formaldehyde	*Nasal irritation*	*Eye irritation*
Formaldehyde ..	0·080	0·061	0·101
Formaldehyde and " Air-wick " ..	Not persistent	0·054	0·094

Table 7.—Adsorption of Ammonia by Silica Gel in Presence of Anti-odorant

Height of column of silica gel (cm.)	*Air speed (c.c. per sec.) at which there could just be perceived:*			*Corresponding critical time (sec.) of contact of odorised air with silica gel to allow perception of*		
	Smell of ammonia	*Nasal irritation*	*Eye irritation*	*Smell of ammonia*	*Nasal irritation*	*Eye irritation*
4·9	16	16	16	0·153	0·153	0·153
5·2	17	17	17	0·153	0·153	0·153
7·1	21	21	21	0·169	0·169	0·169
9·8	24	24	24	0·204	0·204	0·204
10·3	26	26	26	0·198	0·198	0·198
Mean critical times of contact (sec.) ..				0·175	0·175	0·175

Corresponding results in the absence of " Air-wick " are shown in Table 8.

Table 8.—Adsorption of Ammonia by Silica Gel Without Anti-odorant

Height of column of silica gel (cm.)	*Air speed (c.c. per sec.) at which there could just be perceived:*			*Corresponding critical times (sec.) of contact of odorised air with silica gel to allow perception of:*		
	Smell	*Nasal irritation*	*Eye irritation*	*Smell*	*Nasal irritation*	*Eye irritation*
3·9	11	11	11	0·177	0·177	0·177
5·6	18	18	18	0·156	0·156	0·156
6·8	16	16	16	0·213	0·213	0·213
7·8	19	19	19	0·205	0·205	0·205
9·0	27	27	27	0·167	0·167	0·167
Mean critical times of contact (sec.) ..				0·184	0·184	0·184

withdrawn before the true smell could be recognised.

Similar experiments were made with the omission of bottle D containing the " Air-wick " from the train of apparatus. The results so obtained have already been published[8] (Moncrieff, 1955), but the figures are reproduced here for convenience of reference. They are shown in Table 2.

A comparison of the critical times of contact with the adsorbent of the odorised air in the presence and in the absence of the anti-odorant is informative, and is shown in Table 3.

It is clear that the anti-odorant has had no significant effect on the critical times of contact for nasal and eye irritation, but that it has effectively neutralised the true smell of the acetic anhydride. This neutralisation appears to be a clear case of odour counteraction and not to be the result of any anæsthetic action, for if the latter had been the cause of the failure to detect the smell, then the trigeminal nerves would also have been affected and the critical contact time for nasal irritation would have been greatly reduced.

Formaldehyde. A 40% solution (50 ml.) of formaldehyde in water was used in the first bottle C and " Air-wick " fluid (50 ml.) in the second bottle D. Active carbon was again the adsorbent. Experimental results were as shown in Table 4.

It is known[9] (Chanell, 1953) that " Air-wick " fluid does not contain formaldehyde, so that there was every chance for the formaldehyde odour to appear through the " Air-wick " odour if it had not been neutralised. Occasionally at high air-speeds the formaldehyde was in fact fleetingly detected, but it never persisted, and no reliable measurements of the air-speeds at which it appeared could be taken. Ordinarily when an odorant breaks through the carbon bed as the air-speed is raised the smell persists, and if the air-speed is raised even slightly more the smell becomes strong; the formaldehyde odour in the presence of the anti-odorant did not behave in this way.

A comparison of the critical times of contact of the formaldehyde-odorised air with the adsorbent with and without " Air-wick " is shown in Table 6.

It is clear that within the limits of experimental error the critical

times of contact for nasal and eye irritation have not been changed by the presence of the anti-odorant, but that nevertheless the true odour has been almost completely neutralised.

Ammonia. A 15% solution of ammonia (50 ml.) in water was used in the first bottle C and " Air-wick " fluid (50 ml.) in the second bottle D. Because of the poorness of the adsorption of ammonia by active carbon, silica gel was used as the adsorbent. Experimental results were as shown in Table 7.

The reduction in critical contact time from 0·184 sec. in one set of experiments (Table 7) to 0·175 sec. in the other is not significant and apparently the anti-odorant has no effect on the ammonia. Smell, nasal irritation and eye irritation are all perceived simultaneously and the presence of " Air-wick " makes no difference to these perceptions; evidently there is no constituent in " Air-wick " which will counteract or " pair " with the smell of ammonia. It is surprising that whereas in the presence of " Air-wick " it is impossible to recognise the smell of acetic anhydride and of formaldehyde with certainty before nasal irritation has become so intense that it makes a continuance of the observations impossible, yet the presence of " Air-wick " has no noticeable effect on the smell of ammonia.

Triethylamine. 50 ml. of triethylamine was placed in bottle C, and 50 ml. " Air-wick " fluid in bottle D. Active carbon was the adsorbent. Experimental results were as shown in Table 9.

A comparison of the critical times of contact of triethylamine-odorised air with the adsorbent, with and without " Air-wick " is shown in Table 11.

It is clear to see that the sensitivity of the nose and the eye to irritation caused by the triethylamine have not been affected, but that the sensitivity of the sense of smell towards triethylamine has been somewhat reduced by the presence of the anti-odorant. Whereas ammonia in so far as concerns its stimulation of smell, nasal irritation and eye irritation is unaffected by the odour-counteractant " Air-wick," yet the true smell of triethylamine is partly counteracted. Probably this difference can be attributed to the more organic nature of triethylamine, to its higher molecular weight and to its greater similarity to naturally-occurring odorous materials.

Table 9.—Adsorption of Triethylamine by Active Carbon in Presence of Anti-odorant

Height of column of active carbon (cm.)	*Air speed (c.c. per sec.) at which there could just be perceived:*			*Corresponding critical time (sec.) of contact of odorised air with active carbon to allow perception of:*		
	Smell of triethyl-amine	*Nasal irritation*	*Eye irritation*	*Smell of triethyl-amine*	*Nasal irritation*	*Eye irritation*
7·5	16	19	16	0·234	0·197	0·234
8·3	19	27	16	0·218	0·154	0·259
8·5	20	26	15	0·213	0·163	0·283
9·2	18	23	18	0·256	0·200	0·256
11·1	19·5	29	17·5	0·282	0·192	0·317
Mean critical times of contact (sec.) ..				0·241	0·181	0·270

Corresponding results in the absence of " Air-wick " are shown in Table 10.

Table 10.—Adsorption of Triethylamine by Active Carbon Without Anti-odorant

Height of column of active carbon (cm.)	*Air speed (c.c. per sec.) at which there could just be perceived:*			*Corresponding critical time (sec.) of contact of odorised air with active carbon to allow perception of:*		
	Smell	*Nasal irritation*	*Eye irritation*	*Smell*	*Nasal irritation*	*Eye irritation*
8·0	16	24	17·5	0·250	0·167	0·229
8·8	16·5	22	17·5	0·267	0·200	0·251
9·0	16	25	17	0·281	0·180	0·264
9·9	16·5	27	18	0·300	0·183	0·275
12·5	19	35	20	0·329	0·179	0·313
Mean critical times of contact (sec.) ..				0·285	0·182	0·266

Table 11.—Effect of Anti-odorant on Reactions to Triethylamine

Air odorised with:	*Critical time of contact (sec.) of odorised air with adsorbent for:*		
	Smell of triethylamine	*Nasal irritation*	*Eye irritation*
Triethylamine	0·285	0·182	0·266
Triethylamine and " Air-wick " ..	0·241	0·181	0·270

Conclusions

1. The technique of progressively reducing the concentration in air of an odorous irritant plus an anti-odorant by passing the air through an adsorbent disentangles olfactory stimulation from trigeminal and ocular irritations.

2. When air containing an odorous irritant was passed over an anti-odorant (" Air-wick "), the incidence of eye and nasal irritation was in no case affected, demonstrating that the anti-odorant had no anæsthetic action. The true smells of acetic anhydride and of formaldehyde were effectively neutralised by the anti-odorant, and that of triethylamine was considerably reduced as was shown by the shorter time of contact with an adsorbent which was subsequently necessary to remove the odour completely. Of the four odorous irritants used, ammonia alone was substantially unaffected by the anti-odorant.

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Methanol and Formaldehyde Production

THE *Inventa* processes for the manufacture of methanol and formaldehyde are now available in Britain. Head Wrightson Processes Ltd. have completed an agreement for designing and supplying plants for these processes.

The raw material for methanol manufacture is synthesis gas produced from coal, coke, oil or natural gas.

The source and analysis of the gas are of great importance in the design of the plant; this applies especially to the contents of impurities and inerts in the gas. The main reaction is a combination of carbon monoxide and hydrogen to form methanol.

The synthesis gas is fed to a multistage compressor and compressed. Synthesis pressure on the pure reactants should be about 285 atmospheres, but the total pressure depends on the level of inert gases; the usual pressure is between 310 and 350 atm. Normally, a six stage compressor is used with intermediate coolers and separators after each stage. If the synthesis gas contains iron carbonyl, Fe $(CO)_5$, this catalyst poison must be removed by a special trap to be placed after the compressor. Thereafter the gas goes to the oil filters where oil and other condensed constituents are separated from the gas.

The oil filters are followed by the reactor. The cold synthesis gas passes through a heat exchanger in counter-current to the hot reacted gases and flows to the catalyst basket. There, part of the synthesis gas (13-14% max.) reacts to methanol, whereby heat is produced. The hot, reacted gases flow through the heat exchanger and leave the reactor.

The gas mixture is piped through an atmospheric condenser where the condensable parts are liquefied (methanol, water, high alcohols). The bulk of fluids is piped to the separator where it is separated from the non-reacted gases. If dimethyl ether is to be recovered, it is separated under pressure and liquefied. The non-reacted gases flow to a recycle pump and then again to the oil traps where they are mixed with the fresh synthesis gas. The recycle pump has to raise pressure in order to surmount the pressure drop of the whole system.

The crude methanol stored in a separator is expanded through a let-down valve into a vessel. The bulk of the gases, dissolved in the crude methanol, is separated from the liquid and can be used for other purposes.

A distillation column separates the crude product into the pure methanol, higher alcohols and water.

The catalyst used for the *Inventa* process has given proof of good performance and it is considered the best available. Its life is claimed to be over a year when the synthesis gas is as prescribed, and the plant is properly operated. The catalyst is not sensitive to sulphur compounds. Despite this, the maximum content of sulphur in the synthesis gas has to be specified, because sulphur may cause severe corrosion in the system. Iron carbonyl (Fe $(CO)_5$) is a strong catalyst poison and can be tolerated only in very small amounts.

The catalyst works at temperatures of 320°–340°C. Therefore the amount of higher alcohols produced and methane formation are low.

The catalyst is pre-reduced, which gives additional advantages. Exchange of the catalyst does not cause long shut downs, since operation can be started immediately after a new filling of the reactor, no further reducing of the catalyst in the reactor being necessary. The main part of volume reduction has taken place by pre-reducing.

The catalyst is not sensibly harmed by shut downs and restartings of the plant. Should the reaction stop due to faulty operation, it can be easily started again by means of the reactor's heating device.

A good synthesis gas has the following composition, by volume, on dry basis:

Hydrogen	66·7	%
Carbon monoxide	31·7	%
Carbon dioxide	0·10	%
Methane, nitrogen and argon	1·50	%
Hydrogen sulphide and sulphur carbonyl less than	3	ppm
Iron carbonyl less than	3	ppm
Acetylene less than	3	ppm
Saturated hydrocarbons max.	0·50	%

Formaldehyde

Formaldehyde is produced by the oxidation of methanol, which must be of high purity in order to avoid catalyst contamination.

The methanol is diluted in demineralised water and the diluted methanol flows through a filter and evaporator which is heated by steam. A Roots blower takes air through a filter and an air cleaner. The air is then blown into the evaporator, and the mixture is evaporated and the vapours flow to the reactor. The upper part of the reactor is filled with a layer of catalyst and the oxidation of the methanol takes place at about 560°C. The reactor gases then flow through a quench cooler where steam is produced and this steam is used for heating the evaporator. The cooled gases are piped to an absorber where formaldehyde and the rest of the methanol is dissolved in water. In order to raise the concentration of the formaldehyde in water the solution is recycled to the absorber. From the absorber the formaldehyde solution flows through a cooler to a crude products storage tank.

Crude formaldehyde has a formic acid content of about 0·1% by weight and if necessary this crude is pumped to a de-acidifying plant. De-acidifying is done by ion exchange which will reduce the amount of acid to the desired value.

British Chemical Plant. The 1957 edition of this excellent biennial directory has just appeared. Although similar in format to the previous editions, it contains more pages (402), more advertisements (126) and more headings in the index (1,347). This is as it should be because since 1955 the membership has increased to 222. Evidence of the interest in British chemical plant is the increase of 1,000 in the number of copies printed.

With this directory it is easy to find who makes what. There are three sections: list of members with addresses; members' advertisements; and classified index of products and services followed by a multilingual key—French, German and Spanish. The directory fully upholds the prestige of British chemical engineering and Dr. Hoblyn—the BCMPA director—and his staff deserve congratulations.

Drayton/Armstrong steam trap. A new manual published by the Drayton Regulator and Instrument Co. Ltd. contains sections on the workings of traps, capacity charts, selection and sizing for industrial and domestic applications, testing, maintenance and trouble sorting.

PACKAGING TODAY

Machinery ★ Materials ★ Packs

Pharmaceuticals, cosmetics, toilet preparations and chemical products generally are packed in a wide range of materials and containers. The special demands of these products in terms of chemical reactivity, hygiene, safety and sales appeal have stimulated the packaging industry to new efforts and to this extent have played a notable part in its remarkable growth. The same stimulants have been at work in the packaging machinery industry and there too growth has been rapid and fruitful. The following review gives at least a partial picture of what packaging offers today—the predominance of plastics, themselves chemical products, is obvious.

Machinery

Checkweighers

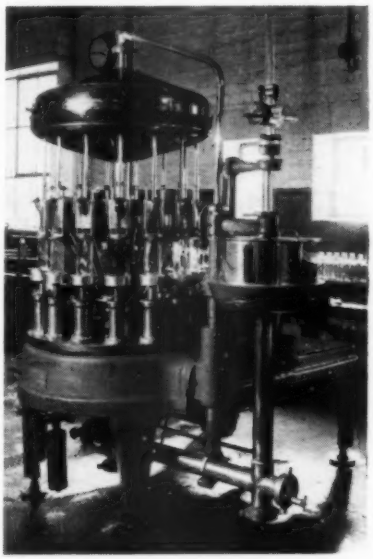
The Solartron Electronic Group Ltd. is marketing *Solarcheck* electronic checkweighers with appropriate mechanical handling facilities, where desired, for most types of weight control before or after packaging. Liquids are weighed in their containers.

The speeds of the Solartron checkweighers range from 60 to 120 items per min. with a claimed accuracy of from 0·1% to 0·2%. The smallest weight which can be handled is 1g. The machines are arranged to indicate, by light signals or other means, packages over and below weight, where the packages are placed manually, at a rate up to 60 per min. on the weighing head. Other models are arranged to weigh at a speed of 120 items per sec. with the over and under weight packages automatically rejected into one or other of two conveyor systems, while the correct weight package continues on the production line conveyor.

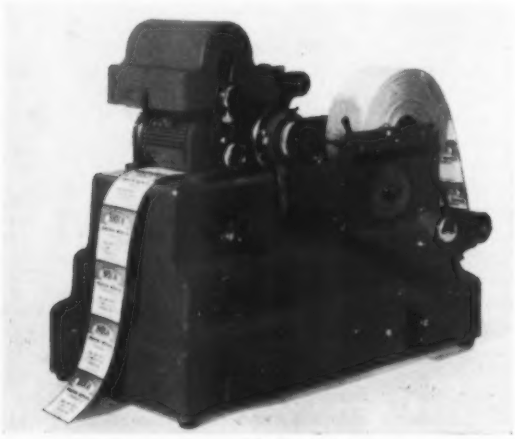
Type NC.630 is the Solartron dough weigher and rejector unit, whereby lumps of dough or baking mixtures are automatically checked for correct weight. The biscuit and packet weigher and rejector unit, Type NC.630, deals with biscuit or other packages.

The weighing head is made either for the mobile type of machine or for equipment for incorporation in existing or proposed production lines.

The latter can be fitted with an "electronic clerk," which automatically controls filling or automatic packaging mechanisms as soon as the checkweigher begins to receive packages of incorrect weight. It will also automatically reconcile the output of the factory, rejected material and the raw material from stock, besides totalling the packages. In other words, it records, electronically, the actual weight of all packages and this data may then be fed to suitable recording or accounting machinery. It can be operated through a punched card system to count individual packages to orders and then, by a simple cable connection, to automatically print the invoice for the corresponding batch of packages, particularly where invoicing is done on the net weight of a container. The basis of the "electronic clerk" is the Solartron analogue to digital converter unit.



Albro vacuum-operated fully automatic liquid filling machine.

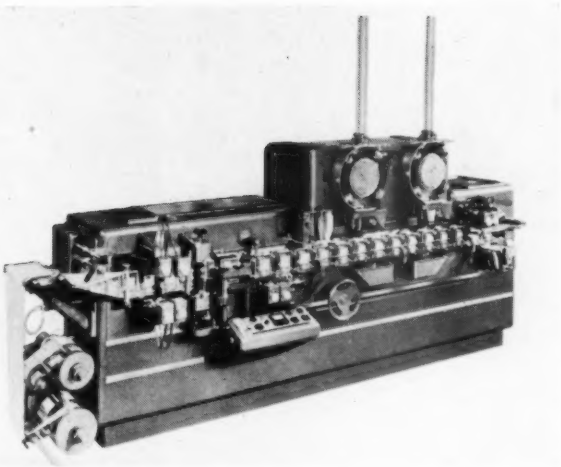


The Tickopres machine by Dapag can be either hand operated or motorised.

Overprinting and marking

Overprinting and marking machines are made by Dapag (1943) Ltd. under the name *Tickopres*. They occupy little more space than a standard size typewriter and print on paper, gummed or ungummed card, washer tags, self-adhesive labels and even on to small collapsible cartons at speeds from 1,000 to 9,000 labels per hr. Printing by these machines is not confined to the use of the modern quick-set type which is supplied in various sizes. Plates bearing any arrangement of rules or any trademark or other design can be cast and affixed to the type drum, thus vastly extending the machine's range of usefulness.

Manufacturing chemists use these machines for overprinting on their bottle labels batch numbers for control purposes and, with some chemicals, expiry dates. Where ampoules are used a very small gummed or ungummed label or possibly a self-



The SIG pouch machine which handles heat-sealing-materials.

adhesive label is employed on which the machine prints the batch number. Another application is the printing of box-end labels which bear particulars of the product and the number of bottles or tins which the box contains. Yet another use is the production of packers' slips which are inserted in tins and boxes.

Dapag's latest machine is the Tickopres model *A3M* which can be either hand operated or motorised and is capable of turning out 150 labels per min. *Tickoset* wheels are available for this model. These consist of engraved wheels which require merely a flick of the wrist to change the details on the printing drum. They can be engraved with letters or figures of varying sizes. Another time-saving accessory is the *Tickoline* key and keyboard. *Tickoline* keys can be bought separately or in sets with aluminium trays or boards with clips to hold them. The keys are split metal rods shaped to take the type when slid in from the pronged end. The end is so shaped that the type can be slid straight from the grooves on the drum of the machine into the channel of the key. There is no fumbling with loose type and no chance with normal care of type being reinserted in the machine in the wrong order.

Pouch forming machine

The Swiss Industrial Co. (SIG) manufacture the PFC machine for forming, filling and closing pouches. It handles heat-sealing materials, including papers from the roll. It makes moisture-proof and airtight packs. It has an output of up to 150 packets per min. taking a maximum size of 130 × 160 mm. (5⅛ in. × 6¼ in.), and a minimum size of 70 × 120 mm. (2¾ in. × 4¾ in.). It will handle all types of powdered products which lend themselves to piston or auger fillings. One operator is required, attendance being confined entirely to the front of the machine. The draw-off of the heat-sealing material, which latter is folded in V shape by a forming head, is effected by two pairs of alternately acting heater jaws which weld the sides of the bags before separating the web from the roll. The bags are transported by a twin chain in two parallel running rows. After welding of the bottom and indelible embossing of a code date, the bags are expanded and positioned beneath the filling station, whereupon the top joint is welded.

The machine is fitted with a photo-electric register to work in connection with panel printed material.

Automatic wrapper

SIG also manufacture an automatic wrapping machine, type HSK, for overwrapping of cartons with cellulose film, including easy opening tape. This machine is adjustable for packets between maximum 5½ in × 3⅛ in × 1¾ in., or else 4⅛ in × 2 9/16 in. × 2 9/16 in. and minimum 3⅛ in. × 1 9/16 in. × 1 3/16 in. Depending on the size and programme of the machine, it produces 80-120 packets per min., the speed being steplessly variable.

Bottle and jar fillers

Albro Fillers and Engineering Co. Ltd. make vacuum operated filling machines for handling liquids and semi-liquids and light creams into all sizes and shapes of bottles.

For small outputs there is the Junior type machine which will take a wide range of liquids and will handle sprinkler neck bottles for perfumes. This machine will handle all sizes and shapes of bottles up to about 8 oz. and is claimed to fill every bottle to a uniform and accurate level without waste, drip or soiling of the bottle.

A model for larger bottles, the Major type, incorporates a table lifting platform which holds the bottle to the nozzle during filling. Another adaptable machine is the Albro 4-head filler, a semi-automatic machine self-contained with its own vacuum pump and motor, and float tank and float.

On 6 oz. bottles a production of 2,160 per hr. is claimed and on 26 oz. bottles 960 bottles per hr. It is easily cleaned out when changing to different products and can also be constructed with wheels if required for mobility.

The company's fully automatic filling machines can produce up to 12,000 bottles per hr. One of the 15-head fully automatic models handles a well-known antiseptic at a speed of 4,800 bottles per hr.

Albro powder filling machines fill all types of powders into tins, bottles, cardboard drums and fragile containers such as face powder boxes, and they can also be adapted for handling polythene containers. These machines fill dustlessly in an enclosed circuit and are especially useful in the pharmaceutical and cosmetic industries.

Carton overprinters

The introduction of the Rejafix high-speed carton overprinter Model K.2. coincides with the 35th anniversary of the firm. It has been designed to overprint in one operation details such as code, date, batch, contents, agents' and retailers' addresses. It is suitable for long or short runs with a high speed performance up to 200 prints per min. It can be used with either metal or rubber types or plates. Single line metal type holders are provided also to enable operator to make quick changes. Its capacity covers range of cartons from 1¼ in. to 3½ in. collapsed width and from 1¼ in body length excluding flaps up to 8¼ in. overall body length including flaps. Besides collapsible cartons, it can also be used for flat-surfaced objects such as rigid cardboard, plastic, metal pieces, etc., minimum thickness 0·010 in. maximum thickness 0·065 in.

The machine is portable, being a compact totally encased bench model size 14 in × 14 in. × 18 in. high with an automatic self-stacking conveyor belt 18 in. long. Changing from one size of carton to another takes less than 60 sec. while changing print details takes about the same time. Location of the printing text requires only two adjustments. The feed and take-off arrangements are described as straightforward, the operator placing the cartons into an adjustable magazine, holding 200 and more cartons at a time. Loading takes place while the machine is running. After passing under the printing cylinder, the cartons are taken away by a continuous conveyor belt and automatically stacked for disposal. The machine is driven by a geared fractional h.p. motor with electrical variable speed control. For use with the overprinter Rejafix Ltd. have formulated special inks to give quick-drying and non-offsetting results.

Manning automatic overprinting machine for cartons.

Pedal operated dispenser by Industrial Tapes Ltd. ▶

A completely automatic machine has been designed by A. J. Manning Ltd. to overprint at speeds up to 100/min. all types of cartons of collapsed dimensions from 1 in ×4 in. to 5 in. × 9½ in.

The use of any standard printer's type in this machine is said to allow overprinting to be placed and matched with other type almost anywhere on the carton, the type being assembled in a chase of standard form (internal dimensions 1¾ in.×3¼ in.) which is held in the machine by means of a quick release mechanism, so that assembled type can be fitted in the machine in a few seconds.

The adjustment of the machine for cartons of different sizes is by means of a rack and pinion mechanism which moves simultaneously the magazine and the guides for the cartons. The inking mechanism is of simple orthodox form for easy cleaning and maintenance. Printing pressure adjustment is of a simple, finger-operated type.

The feed magazine will carry a stack of cartons up to 18 in. high, and the adjustable delivery hopper is arranged so that the cartons are neatly stacked and can be easily removed while the machine is running.

Label and tape dispensing

Leon Davis and Co., who market *Oyster* gummed paper tapes, are now introducing their new range of manual and electric label gumming dispensers. There are three models, Oyster *Imp* manual, the Oyster *Imp* electric fixed speed, and the Oyster *Imp* electric variable speed, which are simple to operate.

The stack of labels is placed between the guide plates, and on turning the handle one label after another is delivered to the operator, evenly glued and ready for affixing to the package.

The *Imp* electric, fitted with a small motor, accelerates the automatic dispensing of labels without the dispenser being handled at any time. With one hand it is possible to take the article to be labelled, and with the other hand the glued label, thereby enabling all attention to be concentrated on the labelling.

The company are also introducing three additions to their range of gummed tape dispensers: The *Speed-O-Matic*, the *Oyster Rex No.* 4 and the *Oyster Rex No.* 8.

The *Speed-O-Matic* is designed to dispense tapes of from ½ in to 1½ in. wide, gum side out, reels being 600 ft. long in the case of parcelling tapes, and 500 ft. long for heavy duty tapes.

The *Oyster Rex* No. 4 and No. 8 machines dispense tapes from 1 in. to 4 in. and 1 in. to 8 in. wide respectively in lengths from 4 in. to 36 in. in one pull.

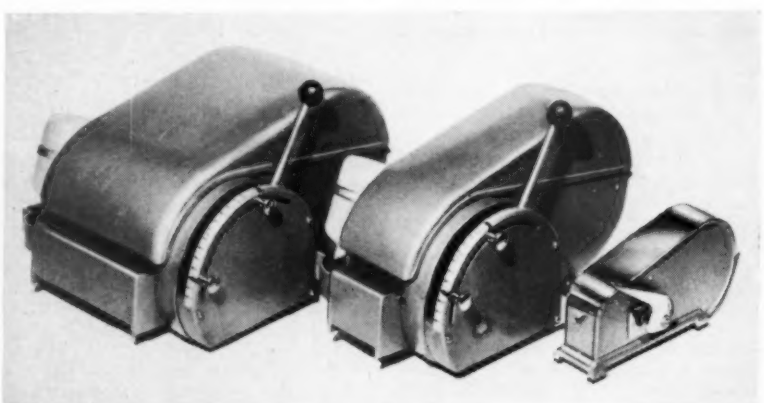
Pedal-operated tape dispenser

Specially developed for rapid sealing, the new *Speedfix* pedal-operated predetermined length dispenser allows for the dispensing of self-adhesive tapes in any required length from ½ in. to 4½ in. On the standard model this is achieved by depressing a hand lever, but where both hands are required free the new foot attachment can readily be fitted. This transfers control from the hand lever to a foot-operated pedal so that after setting up the machine the operator has both hands free. The package can thus be dealt with with one hand while the other is detaching the length of tape required.

The *Speedfix* pedal is a product of Industrial Tapes Ltd. and the price of the complete apparatus is £12 12s.

Fully automatic labeller

The *Pony Labelrite* labelling machine model A.86MO is the latest addition to the range manufactured by Packaging Machinery (Peters) Ltd. It is a fully automatic labeller for a wide range of containers and label sizes and performs the labelling application with the containers standing on the con-



Three types of label gumming machines made by Leon Davis and Co.

veyor in the vertical position. P.M.P. have maintained all the tried features of the semi-automatic Pony Labelrite on this fully automatic version, *i.e.* vacuum pick-up of the labels and all-over glueing of them.

The machine is said to be capable of labelling two containers at a time at speeds up to 120 per min., containers of the larger size are handled singly at speeds up to 60 per min. No operator is required and the easily loaded label magazine would be recharged by the person overseeing the production line.

Aerosol packs and equipment

Universal Metal Products Ltd., now offer a complete aerosol service including trial fillings of both foam and spray type products.

For some time U.M.P. have supplied impact-extruded seamless aluminium aerosol containers and can now offer, in addition to cans enamelled and printed or enamelled only, plastic dispenser buttons, plastic valve covers, and a new type of foam valve specifically designed for rapid gas-charging. The valve is inexpensive, simple in construction, and of streamlined appearance.

This valve can be supplied with mounting cup in plain or lacquered tinplate. Shortly U.M.P. will be able to offer a valve for spray type products which has also been specially designed for pressure filling and can be gas-charged at a very high rate of production.

They can also supply filling equipment ranging from small laboratory apparatus, including valve clincher and pressure testing plant, to fully automatic large-scale equipment. The range includes a product filler and three basic types of pressure gas-chargers:

a—Laboratory equipment for filling cans for experimental work on formulations, performance and corrosion trials.

b—Pressure gas-charger for small runs which can handle up to 1,000 containers per day, depending on the amount of gas to be charged.

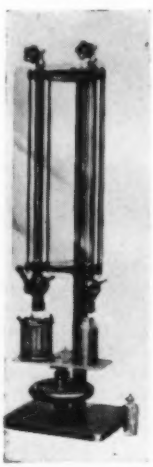
c—Gas-charger incorporated in the semi-automatic and automatic filling lines. This will charge, depending on valve and amount of propellent, up to 60 cans/min.

Accessories including test baths and corrosion testing cabinets can be supplied.

The equipment, including valves, is manufactured by Druk-Pak A.G. The Druk-Pak valve has been successfully used in the U.S.

Three basic types of aerosol filling equipment supplied by Universal Metal Products Ltd. and described above.

A



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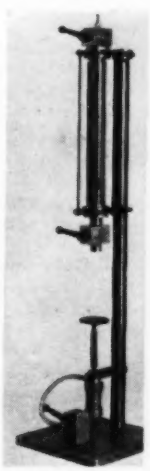

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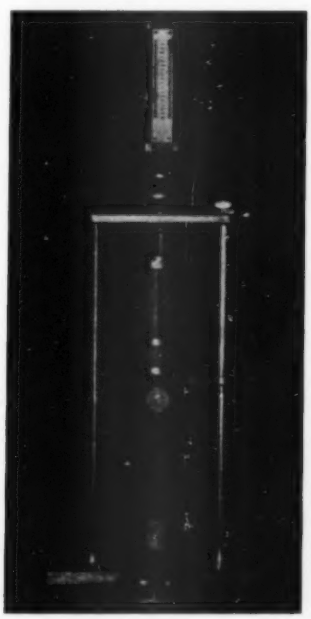
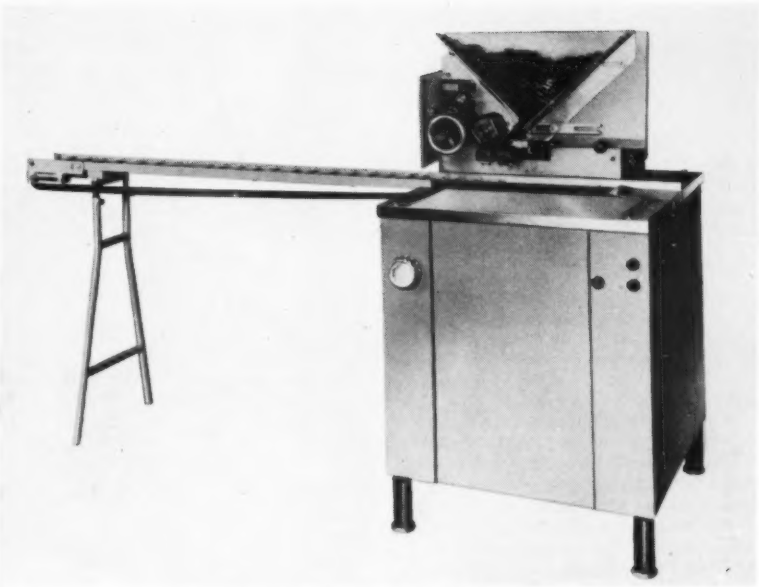




Newman vial and ampoule printing machine.

Vial and ampoule printer

The Newman vial and ampoule printing machine manufactured by D. Trapow and Co. Ltd., incorporates a double impression offset system. Its main advantage is its ability to use quick-drying inks of all colours and to produce work of good density and exceptionally high quality.

The machine is described as being particularly suitable for printing cylindrical objects of glass, metal, plastic, cardboard and other materials. When using quick-drying inks the printed objects are dry enough to be handled at the end of the output conveyor. The output is 70-100 per min. depending mainly on work diameter. According to the makers the changeover of printed matter takes 2 min., code 4 min., change of diameter of object takes 6 min. and an ink cleandown 5 min. There are no change parts and the adjustments are simple.

The ink is contained in a narrow, easy-to-clean duct which has a single screw adjuster. The distributing roller has a long lateral stroke and carries the ink along the ink roller which in turn inks the surface of the rotary printing cylinder, part of the printing cylinder is relieved to accept the electro and coding types. The offset segment receives two impressions for each object printed.

Two pairs of adjustable spring-loaded rollers are mounted on the carriage which reciprocates between the offset blanket and the mouth of the hopper, where the objects are collected singly on the rollers for printing. The offset segment spins the object on the rollers to transfer the impression, after which the rollers open to allow the printed object to fall on the conveyor.

Steel strapping

The Gerrard Industries Group, which incorporates Seal-less Strapping Ltd., supplies a range of tensional steel strapping machines for securing any type, size, shape or weight of package with either flat, round or oval steel strapping. Ranging from machines for 19½ gauge round wire to those for 2 in. flat steel strapping, the equipment offers protection and security for a diversity of products.

The Gerrard seal-less fully automatic flat band machine is capable of securing 400 cases per hr., each with two bands.

The Gerramatic machine in which the tensioning and sealing operations are entirely automatic is particularly suitable for cartons, light boxes and irregular shaped packages. Fitted into a conveyor flow line, the Gerramatic and the seal-less fully automatic machines contribute to automation.

Metal detectors

The *Cintel* electronic metal detector used in the pharmaceutical, chemical and allied industries, while not an item of packaging machinery, is closely related to it. It will detect the presence of any metal, ferrous or non-ferrous, however minute, in any non-metallic product and will either give warning of its presence or automatically reject the product containing it. It forms an adjunct to the packing machinery by ensuring that all products packed are metal-free.

The application of the equipment is by no means limited to the protection of the product, however, but also in many installations to the protection of machinery. Much damage can be caused to processing machinery by the presence of tramp metal in the raw material and this hazard can be met with the use of *Cintel* detectors. Once again, fully automatic operation ensures that any contaminated material is ejected from the conveyor line without human intervention.

A new type of search head has been introduced specifically for small products such as pills. It differs from the window type head and takes the form of a flat plate over which the product passes. This head has the advantage of being simpler to install, occupying less space, and does not require the conveyor belt to be threaded through a window. It loses nothing in sensitivity, but is only suitable for small objects.

Venesta aluminium elongated tubes.

Long nozzle tubes

Venesta Ltd. are producing ½ in. dia. elongated nozzle tubes in aluminium which, they say, provides a cost saving of about 2s. per gross over similar tubes in tin. This type of tube is used for intra-mammary injections of penicillin, and other veterinary and pharmaceutical purposes.

Previous difficulties in getting aluminium to " flow " in the nozzle-forming dies have been overcome by Venesta, who have carried out modifications to small-diameter extrusion presses.

A danger in the extrusion of elongated tubes, whether of aluminium or tin, is the occurrence of small particles of metal around the nozzle. These particles or " hairs " are usually too small to be seen by the naked eye, and therefore a system had to be devised that could quickly and accurately check tubes for such minute defects. To achieve such a check Venesta designed and built a projector, and tubes taken from the production unit for testing are placed in a V-shaped vice in front of a strong light.

The light throws the greatly magnified shadow of the tube—and particularly that of the nozzle—on to a screen a few feet away, and any " hairs " or particles of metal are immediately shown up on this image against the outline of the tube.

Metal containers

The Metal Box Co. has produced a tin for highly corrosive liquid detergents. Corrosion of the metal is prevented by lacquering twice, once before and once after printing the outside decoration, and by having a cement and not a soldered side seam. To avoid corrosion at the shoulder piercing, the raw edge there is bedded in a polythene neck, which has a lip to prevent dripping. Thus plastics are combined with a tinplate, all being made by Metal Box.

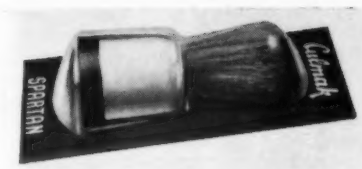
The company make many millions of ends for processed food cans each year. This production has been applied to the tablet and lozenge trade, by using two pieces of tinplate, the exact size of two standard can ends, to make the new 1-oz. Nuvac tin. The base is made from a bigger piece than the lid, and both are drawn into shape on high-speed presses. The tins are made with all the economies of mass production. There are two sizes, deep and shallow, both of 2¾ in dia.

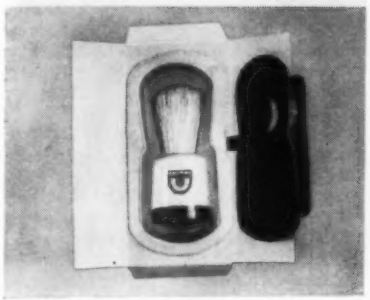
Another new vacuum tin for tablets is the *Floseal* tin, of rectangular pocket size. Instead of the old type of rubber ring, a rubber based compound is flowed into the base and sides of the groove round the inside of the lid. Two slots on opposite corners of the body make it easy to open with a coin.

Visible cosmetic pack

Plastic Bubblepaks are reported to be simplifying Max Factor's Continental promotion of Creme Puff and Invisible Foundation.

A free sample tube of Invisible Foundation is being offered with each Creme Puff refill and the two products are displayed in separate contoured bubbles on a single card base. These cards, in a dainty pink, have been printed in seven languages, including Swedish, Dutch and French, to cover the continent-wide campaign. To eliminate error the reverse side of the card is stamped out to allow the shade





of the Creme Puff to be read directly from the base of the tin.

Bubblepaks are marketed by the Plastic Packaging Division of Gordon and Gotch Ltd.

The Metal Box Floseal tin for vacuum packing tablets and lozenges. The slot in the right-hand corner makes it easy to open with a coin. ▶

◀ **Bubblepak by Gordon and Gotch.**

Polythene-lined pockets

John Dickinson and Co.'s *Weldex* polythene-lined pockets are new moisture-proof packs designed to keep powders powdery and pure. First used for lemonade powders, they are now used in fields as varied as ethical drugs and paperhanger's paste. They are supplied either plain or colourfully printed by letterpress, lithography or gravure and one of the strong points made by John Dickinson & Co. is that they can print to the edge. Easily filled by hand or by automatic filling machines of all types. *Weldex* polythene-lined pockets can be supplied in comparatively small quantities at economical cost.

Dickinson's *Holdfast* cellulose self-adhesive tape is available in 36 and 72 yard rolls, in widths from ⅜ in. upwards, and is packed in a distinctive blue, white and red tin.

Special papers

Four new specialised papers have been added to the range of William Palfrey Ltd. They are available in sheet or bulk, and also in the form of *Palfsacks*, multi-wall paper sacks.

The *Seven-O Sized Neutral Papers* are chemically inert. Developed in collaboration with the U.S. Navy, they are used in contact with steel, copper, tungsten, aluminium, nickel, silver, brass, manganese, zinc and cadmium. Claimed to have no corrosive effect, they can be used for interleaving, wrapping and storage protection for long-term or overseas requirements.

The *Flame-Resistant Paper* complies with the U.S. Government non-charring standards and may be used for protecting goods in storage, as base paper for reflective insulation, as arrestors (or filters) for paint spraying booths, as filters for warm air heating systems, and as drop cloths for painters, etc.

It is said that *Nevermold* 101 is the most effective mould-resistant paper available. It has no deleterious or corrosive effect on metals, and its mould resistance can withstand most climatic conditions.

Scrimtex is a new development in that a fibre-glass or rayon reinforcing scrim is built into the paper during the manufacture. It is not laminated; the paper is claimed to have exceptionally high tear resistance, and tears once started cannot spread beyond the reinforcement.

Labels

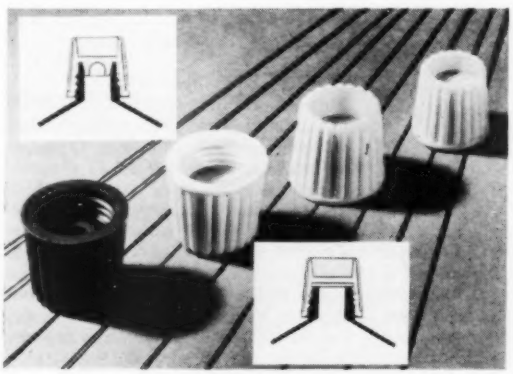
In the last two years John Gosheron & Co. Ltd. have produced over 20,000 different sizes, shapes, colours, and printings of Tickotabs, self-adhesive labels.

Tickotabs can be supplied in a wide range of sizes in plain and in 24 standard colours, or colour of customer's choice.

They are available in any shape in paper, foil, cloth, acetate, or in flock material, with two grades of adhesive, ordinary Texgrip, part coated or fully coated, with adhesive on both sides. They can be printed by letterpress, gravure or die seal process, and cost 4s. per 1,000.

Automatic and semi-automatic dispensing machines have been developed for use with Tickotab self-adhesive labels.

John Gosheron & Co. Ltd. offer a complete labelling service and free advice on any labelling problem.



"Flowerpot" caps for tubes are supplied by John Dale as compression mouldings from any of the range of paper filled and wood filled urea colours and fitted with various liners. They are available in the popular 95 and 115 dia. nozzle sizes. On the No. 115 size, a wedge type wadless closure with the same exterior design is also offered. It effects a seal on two surfaces.

Laminated film

A popular way of packing cream or liquid shampoos is in a sachet made of a Metal Box lamination, such as Tripolam A1. This is made of acetate film, aluminium foil and *Pliofilm*, supplied in reels which can be colour printed. *Pliofilm* is liquid proof, and foil is a good barrier against moisture-vapour and gas, so that the shampoo retains its properties. The acetate film is reverse printed to protect the design, and give a bright, glossy surface.

Metathene, the new polythene-coated cellulose film made by Metal Box, is used to pack an antibiotic for slowing up the decay of whale carcasses. According to the makers it was chosen because it stays flexible well below freezing point, and keeps out air and moisture vapour effectively.

Polythene film

British Cellophane Ltd. state that their polythene film will withstand changes in humidity and immersion in water and that it will not tear readily at perforations. It is claimed that the film is not affected dimensionally by normal changes in temperature or relative humidity. It is inherently flexible, say British Cellophane, even at −50°C. (−58°F.), and contains no plasticiser which might be extracted and so cause embrittlement.

The film's smooth, dry surface enables wrapped articles to be stacked without risk of the packages sticking to each other. Two films with special surface properties which can be supplied are B.C.L. "K" polythene for printing, laminating, and adhesive tape manufacture; and anti-static film. Resistance to moisture and water and also to gas permeability are two other properties claimed for this material. It is almost completely chemically inert.

B.C.L. polythene film can be easily heat-sealed to itself and a wide range of suitable sealing equipment is available. It can also be sewn and is stated to be suitable for laminating to cellulose film, paper, metal and cloth. "K" polythene film is recommended for laminates produced by heat and pressure. This is specially treated on one side to improve ink adhesion for printing by flexographic (aniline) or gravure processes in several colours. Polythene film (including untreated material) may also be printed by hot transfer techniques.

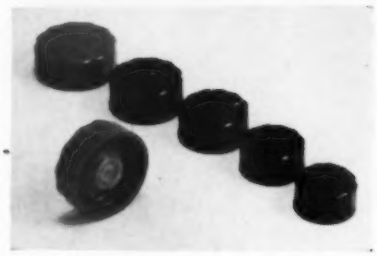
Oppenheimer's *Hypak* polythene packaging is claimed to be an inexpensive and serviceable means of packaging any commodity. It has been extensively used by expeditions to the Arctic, Antarctic and Tropics. The material used is that converted by *Hypak* for commercial use in a wide variety of sizes, plain or branded, in many colours.

The *Hypak* packaging system includes the *Polysealer*, a single-action machine for fast and simple sealing of all standard gauges of polythene; it is designed primarily for sealing of bags containing liquid or free-flowing materials.

Viscose seals

Viscose seals made by the Viscose Development Co. are used to seal the primary closure to the bottle neck and protect all types of liquids ranging from the bottle of perfume to the pint bottles of blood plasma. The seals are said to be extensively used on bottled liquids made by the manufacturing chemist, since they are hygienic and act as a dust and insect-repellent, and prevent evaporation.

They come in two types: *Viskrings*, or bands, are used to secure stoppers, screw caps, *Kork-n-Seal* closures and



John Dale offer these plastic peg caps with polythene cone liners.

rubber caps. These are open at both ends. *Viskaps* are closed at one end and can be used as final closures for straight or tapered corks, or can be used *under* screw caps in order to reduce leakage or evaporation. Both seals are non-metallic, non-inflammable and hygienic.

According to the manufacturer the viscose seals reduce pilferage, act as a dust and insect repellent, reduce leakage and evaporation and prevent corks blowing. The basic ingredient of the seal is a high-grade wood pulp.

The seals are despatched to the manufacturer in sealed tins, in a solution of soft water, a plasticiser and preservatives to keep them in perfect condition until required. Applied wet, the seals shrink as they dry, providing a very tight seal, fitting the exact contours of the bottle. Once fitted, the seals are reported to be tamper-proof, easy detection being possible since it is necessary to slit the seal when opening. A variety of coloured seals is available. Removal is easy and this has been still further facilitated by the introduction of perforated seals.

Collapsible containers

Collapsible light alloy containers with hardened steel corners are, according to the makers, Tracons Ltd., only half the weight of wooden cases and can be folded in one piece to one fifth of their packed size for return. They can be hired from 5s. 9d. per month, according to size and period of hire.

Wooden container

A wooden collapsible container, the *Retemba*, is now being marketed by Warwick Production Co. Ltd. who have obtained the sole manufacturing and distribution rights in the United Kingdom. There are no loose pieces and the whole unit collapses to 17% of its extended volume. The panels are constructed of weather-proof laminated timber specially bonded and treated to withstand rough usage. The frame is fabricated of corrosion-resistant, heat-treated aluminium alloy extrusions, with the base providing positive stacking whether erected or collapsed.

The interior has sheer sides free from obstruction. All fittings are housed so that full internal capacity can be used. These fittings—handles, clasps, hinges—are of cadmium-plated steel, the clasps being of spring steel. An automatic clip fastener at each end of the container incorporates a quick-release pull-toggle. The fastener forms an effective seal.

Use of this container is said to cut packing and freight costs. Its low weight in comparision to its volume, its small storage space, and its quick erection and collapsing are other advantages.

The size range of the *Retemba* can be extended to meet almost any requirement. At present containers with capacities of 3·9 and 5·8 cu. ft. are available.

Container No. RT 4 has the following internal dimensions: length 30 in., width 15 in., depth 15 in., capacity 3·9 cu. ft., weight 29 lb. Its collapsed volume is 17% of its erected volume. Container RT 6 has the following internal dimensions, length 30 in., width 22½ in., depth 15 in., capacity 5·8 cu. ft., weight 37 lb.

Cardboard cartons

When automatic packaging and sealing are employed fibreboard cases are advantageous. Thames Board Mills Ltd., manufacture cartons of *Thames Board* and *Fiberite* in solid or corrugated cardboard. They are supplied in all shapes and sizes and printing is undertaken to meet specific requirements. Thames Board are the largest manufacturers of board and packing cases in Britain.

Ampoules, vials and tubes

Printed glass containers are made by Johnsen and Jorgensen (Flint Glass) Ltd. Neutral glass ampoules, injection vials and cartridge tubes are some of the tubular containers supplied, these being less than 6 in. high.

Soda glass tablet tubes and vials are also available in sizes from ½ in. to 6 in. high. Screw caps are made by the company for liquids and polythene plugs are made for tablets or powder products. They also make polythene pill boxes.

In co-operation with the Ivers-Lee Packaging Service, Parke Davis and Co. Ltd. have evolved an idea for the sampling of tablets to the medical profession. On their fully automatic machinery Ivers-Lee have produced Multipack sachets. The Bardase pack contains six tablets and the Alophen pack contains 12 pills; they are filled and sealed in cellulose film in one operation. The finished Multipacks are hand packed into attractively printed plastic boxes supplied by the Plastic Box Co. Ltd.

Plastic screw closures

John Dale offer standard plastic peg caps with polythene cone liners in the 18 mm. R.3 sizes, which completes the set for 2 oz. to 8 oz. bottles with the R.3 finish; viz. 18 mm., 20 mm., 22 mm., 24 mm., and 28 mm. In addition they offer a 31 mm. medium deep cap made to the R.4 specification which is suitable for Winchester bottles.

This is a two-piece plastic screw closure for bottles and jars, comprising a hard urea peg cap with a polythene cone liner.

On the inside of the plastic screw cap a perpendicular peg accepts and locates a hollow polythene cone and retains it in position in the cap at all times. As the cap is screwed on, the cone is first compressed into the bottle neck to create a corking seal on the inside and then bends and takes the shape of the bottle, riding out over the whole top of the lip, providing an airtight seal.

If bottles are used which are made by modern methods with no vertical fin the contents are retained withous leakage, and the closure preventt atmospheric moisture being absorbed by products such as powders, tablets, etc.

This feature obviates the need for shives, plugs and other subsidiary internal and external seals. Another feature claimed for the cap is that if it is subjected to vibration or changes of temperature in transit it will not ease off, and it can turn through 120° without breaking the seal.

Coloured transparent tape

3,215 different colour combinations are now available in the standard range of printed sellotape marketed by the Industrial Sellotape Division of Gordon and Gotch Ltd.

G. and G. offer up to four-colour printing on a wide variety of background colours or on clear transparent Sellotape. Outside the standard range, printing incorporating any colour matching within the scope of aniline inks is available.

Specialised tapes

Also included are other specialised tapes in the Sellotape range, No. 12 Vinyl tape, cellulose acetate tape, ethyl cellulose tape, and reinforced banding tape. Printed Sellotape is available in 36 yd. and 72 yd. rolls in 11 different standard widths ranging from $\frac{3}{8}$ in. to 3 in. Widths up to 6 in. are manufactured to order. The wider tapes are given a quick-release treatment which, according to the makers, allows for quick and easy application, despite strong adhesive powers.

Pressure-sensitive tapes

Products manufactured for the packaging industry by the Minnesota Mining and Manufacturing Co. Ltd. fall under two headings—*Scotch* applicators and dispensers, and *Scotch boy* pressure sensitive tapes. The company has a department which studies customers' requirements and recommends the most suitable tapes and tape machinery for their particular problems.

METAL CONTAINERS

Examples of metal containers made by Huntley, Boorne and Stevens Ltd. They include rectangular 1 gal. tins; round lever tins with lithographed lids and bodies; round polishing compound tins, rectangular fully soldered cans fitted with Presscap necks; round slip lid powder tins, rectangular seamless pastille type boxes and first aid boxes.

Flat surface applicators SE 601 and SE 602 automatically apply tapes of up to 1 in. and up to 2 in. respectively at rates of up to 75 units per min. They are designed to fit into existing product line operations.

The combination package bundler is an automatic machine with two dispensing heads which apply and cut off tape as packages pass between them. It is adjustable to various shapes and sizes of packages and will fit most conveyor line set-ups.

The pad applicator SE 603 automatically applies up to 300 predetermined lengths of tape per min. to a variety of shapes, sizes and surfaces.

The can sealer P.1 automatically seals up to 45 cans per min., at the same time providing a tab to facilitate the removal of the tape when opening.

The tapes suited to packaging in the chemical industry include *Scotch boy* cellulose No. 600 tape, which is available transparent and in 12 distinctive colours, plain or printed, and is suited to most sealing applications, and filament No. 880 tape, a heavy-duty packaging tape used for sealing and reinforcing large cartons.

PVC No. 688 tape is moisture-resistant tape for sealing fibre and glass containers and double coated No. 400 tape is claimed to be ideal for laminating articles requiring high adhesion.

Wadless caps for tubes

A wadless all-plastic cap for collapsible metal tubes is a recent Venesta development. Inside the top of the cap there is a ring of V-shape cross-section which protrudes downwards 0·015 in. towards the cap opening. When the cap is screwed on, the top of this ring presses tightly on to the top of the nozzle face, which is said to give an immediately effective seal.

The *Kapavee* is said to re-seal effectively, even after much use, and its effectiveness is reported to be unimpaired by dimensional variations. The absence of grinding or lapping action is said to ensure that no particles find their way into the product. The cap fits standard nozzle faces without alteration.

COSMETICS and Toilet Preparations

Isotopes for checking packs • Separation of non-ionics and anionics • Test for steroids • Formaldehyde preservatives Cosmetic uses of cationics

By W. W. Myddleton, D.SC.

Radioactive check on packaging

THE occasional defective filling of containers causes much trouble and annoyance, not only to the user who is short-weighted, but also to the manufacturer who finds deterioration of his product occurring in the periphery of any air pocket left in the filled product; this is notably the case in toothpastes and some emulsified creams. Under-filling in tubes and other opaque containers is sometimes detected by weighing, either by a mechanical device which can reject under-weight packages from the stream, or by transfer by hand to a balance. Manual treatment is tedious, promoting fatigue in the operator and thus introducing the possibility of human errors.

The latest form of monitoring device[1] makes use of the radioactive isotopes Cerium 144 which gives an active life of 18 months, Thallium 204 an active life of five years, or Strontium 90 with 40 years active life, as a source of beta rays. The radioactive material is totally enclosed in a small unit which allows a unidirectional beam of beta rays to be directed upon the package under inspection. The rays are soft and are substantially arrested by most common materials placed in their path. On the opposite side of the package any emerging radiation is picked up by a detector, such as a Geiger-Muller counter, and the installation may in most cases be arranged so that the proportion of beta rays arriving at the detector is limited by the quantity of material in the path of the rays. An amplifier may be coupled with the detector to operate a warning buzzer or light, or preferably to operate a mechanism to eject a faulty package from the line.

The system is applied to (*a*) dry powders packed in cardboard cartons or in cans; (*b*) liquids, as for example in aerosol containers; (*c*) pastes, such as toothpastes, shampoos, shaving creams, hairdressings and so on, in tubes; (*d*) solid items such as tablets, capsules and vials packed in a particular pattern in a carton. For example, the system will examine tubes of tablets or tapes of tablets packed in cartons and may be operated to detect a fault in packing such as a cracked or missing tablet, or even a jumbled instead of an ordered arrangement of the tablets.

In the case of creams filled into tubes the presence of an air bubble $\frac{3}{8}$ in. in diameter usually gives a large enough change in signal strength in the detector to ensure rejection of the package. The set-up may be so arranged that such tubes can be examined in their individual cartons to make sure at the same time that each carton contains a tube.

The installation can deal with 200-300 packages per min. according to the accuracy required, and may include a mechanism to total the number examined and the number rejected. A noteworthy feature is that the packages do not require to be regularly spaced on the conveyor belt.

Adequate screening of the small amount of radiation used ensures the complete safety of nearby operators and, moreover, the beta rays have no harmful action on the product. Numbers of these units are now in satisfactory operation, and, as the sources of the beta rays are by-products of atomic reactors, there appears to be a promising future for this system of packaging inspection in many industries.

Separation of non-ionics from mixtures containing anionics

Mixtures of non-ionic and anionic surface-active agents are now used in many toilet and cosmetic preparations, for example in shampoos to give increased foaming power and foam stability and in emulsion creams to increase stability. With this development the need has become urgent for a method of separating and estimating the components of such mixtures. Liquid extraction is difficult because of similarity in solubility; other gravimetric, volumetric and colorimetric methods depend upon a knowledge of the type of non-ionic surface-active agent present.

Two reports have appeared recently on the use of ion exchange resins[2] to separate the ionic from the non-ionic surfactant, one making use of a packed column of the granulated resin as in a chromatographic method,[3] and the other[4] in which the fixation of the anionic component is achieved by adding the granulated resin with stirring to a solution of the mixture in a suitable solvent.

The most effective material for these separations is a strongly basic anion exchange resin as, for example, the quaternary compound trimethyl benzyl ammonium chloride attached to a styrene divinylbenzene matrix.

The packed column method; preparation of the basic resin. In the packed column method the granules require to be sufficiently coarse (50-100 mesh) to allow of a reasonable flow of a prepared solution of the surfactants down a column in a 23 cm. × 30 mm. i.d. tube. The resin is available in the form of chloride and this must first be converted to hydroxide by a somewhat time-consuming procedure.

About 400 g. of the chloride form are weighed into a 1 litre beaker and 500 ml. of 0·05N Na_2CO_3

are stirred with it for 15 min. at room temperature. After filtration on a Buchner funnel the resin is returned to the beaker and the operation is repeated with 500 ml. of 1N NaOH and again with a similar volume of 2·5N NaOH. After filtration the damp resin is packed into a wide glass tube and 1 litre of 2·5N NaOH is allowed to flow through the bed. Finally the resin is removed and washed in a beaker by decantation with distilled water until the washings are weakly alkaline to test paper, and then three times with about 250 ml. of 50% aqueous ethanol, filtering between each alcohol washing on a Buchner funnel. The percolation column is then partly filled with 50% aqueous ethanol and the prepared granules of resin are charged into it.

Removal of the cations. The column thus prepared achieves only one-half of the extraction process, retaining the anions and allowing the cations to pass through. A second column is therefore required to trap the cations and allow only the non-ionic agent to pass out of the system for collection. The second column is packed with an acid cation exchange resin.

Preparation of the acidic resin. A suitable resin for the second stage is a sulphonated styrene divinyl benzene copolymer which exchanges its hydrogen ions for cations such as quaternary ammonium ions, ammonium, sodium and potassium. A smaller tube is required in this case, 25 cm.×10 mm. i.d. A simple washing suffices to prepare the resin, namely three washings by decantation with 250 ml. of the aqueous ethanol. The tube is packed in the same way as the first and is placed below it ready for the analysis.

The separation. The essential requirement of the method is the preparation of a solution of the non-ionic and anionic material in absolute alcohol, and whereas if the product for examination should be a simple shampoo this resolves itself into a straightforward extraction with the alcohol, in the case of more complicated shampoos and such things as emulsion creams an additional problem of separation is set. The alcoholic solution, when obtained, is evaporated to dryness and placed in a vacuum oven at 50°C. overnight. From the dried residue 250 ml. of a 4% solution are prepared in 50% v/v aqueous ethanol, and this is the test solution to be percolated through the double column.

The packed resins are given a final wash *in situ* with aqueous alcohol and 50 ml. of the test solution are pipetted into the upper column. The effluent from the lower column is collected in a tared 250 ml. beaker. The flow is restricted to no more than 5 ml. per min. The system is then flushed with 1×50 ml. lot and then with 3×25 ml. lots of aqueous alcohol and the combined effluent and washings are evaporated on a hot plate to remove the bulk of the solvent. In the meantime a further washing is carried out with 12×25 ml. portions of aqueous alcohol and the washing collected and partially evaporated in a 400 ml. beaker and then added to the tared beaker and evaporated to dryness and dried in a vacuum oven at 50°C. before weighing, as the yield of non-ionic surface active agent in the sample taken.

Results. The results are reported to be reproducible and generally accurate, but a low yield of non-ionic may be obtained if the solubility of this component be low in the aqueous alcohol solvent. When this is suspected by reason of an unexpectedly low yield a further washing of the column with 50 ml. of hot solvent is carried out and repeated until extraction yields no further quantity.

An exceptionally high yield may be obtained in made-up mixtures submitted to check analysis by this method. This does not indicate any weakness in the method, but can be proved to arise from the presence of a non-ionic in the anionic surface-active agent used in making the mixture. A check on the anionic material alone may show in some instances as much as 36% non-ionic in a commercial product. This apparent source of error becomes more important when the proportion of such a commercial article in the made-up mixture is high.

The direct method. In the direct method in which the ion exchange resin is merely stirred with the solution of the two surfactants only one resin is used, a strongly basic anion exchange resin of the type used in the percolation method just described, but in the form of chloride. It is not therefore necessary to convert into hydroxide and this method is in many ways simpler. A preliminary extraction of the mixed surfactants from a toilet or cosmetic article is necessary and the method is subject to the same limitations in this respect as the percolation method.

Two grammes of the mixture of surfactants, whether made up or extracted from a more complex or aqueous mixture, are dissolved in 50 ml. of a mixture of equal volumes of water and methanol. Ten grammes of the chloride resin (200-400 mesh) are added and stirred at room temperature for 5 hr. The insoluble matter is filtered off and washed two or three times by suspension in methanol. The filtrate and washings are then evaporated to dryness on a steam bath.

Removal of cations. The residue from the evaporation contains the cationic portion of the anionic surface-active agent in the form of chloride which is eliminated by extracting the non-ionic material with acetone several times. The acetone extract is evaporated to dryness on a steam bath and dried in an oven at 110°C. before weighing the residue as non-ionic component. It may be that the drying procedure recommended in the percolation method, namely in a vacuum oven at 50°C., is better practice in that it is likely to reduce the possibility of evaporation and chemical change such as oxidation.

This procedure is subject to the same anomalous results as the percolation method when the non-ionic material has low solubility in the solvent and when the commercial anionic material contains a nonionic component. Otherwise the accuracy and reproducibility of the results are claimed to be good. The author finds it useful to determine the refractive index of the separated non-ionic surface-active agent and also the ash content as measured by ignition in the presence of nitric and sulphuric acids.

Both reports indicate that further work is in progress to achieve the quantitative recovery of the anionic material from the resin and also to extend the application of the method to the separation of non-ionic from cationic surface-active agents.

Spot tests for steroids

The steroids can be identified by characteristic colorations produced by reagents which include concentrated sulphuric acid, perchloric acid and antimony trichloride. An examination has been carried out

on the use of *p*-toluene sulphonic acid in colour tests and both the colorations and fluorescence colours produced by this reagent with 29 different steroids have been described.[5] It is claimed that *p*-toluene sulphonic acid gives rise to much more vivid colours and more intense fluorescence than sulphuric acid and it has the added advantage that it does not give rise to carbonisation. This would appear to be a special advantage when chemically active non-steroids are present. Non-steroids either develop no colour, or colour without fluorescence when treated with *p*-toluene sulphonic acid.

In carrying out the test a volume of solution containing 0·01 mg. to 0·1 mg. of the steroid is pipetted into a depression on a white porcelain spot-plate and the solvent evaporated. The residue is overlaid with 20 mg. *p*-toluene sulphonic acid and heated on a hotplate maintained at 110°-120°C. The acid melts between 104° and 106°C. and the colour develops during the process of melting, becoming more intense after a little further heating. The fluorescence is best observed under an ultra-violet lamp.

As little as 3×10^{-3} mg. estrone can be detected by colour after reaction and 5×10^{-3} mg. by the fluorescence.

Formaldehyde-releasing agents as preservatives

Formaldehyde has powerful antiseptic and preservative properties, but it cannot be recommended for cosmetic preparations which are applied to the skin for more than transient periods. Apart from dermatological action it is too volatile to afford adequate preservative control indefinitely in packaged goods, particularly when the user has broken the seal. From time to time compounds which slowly liberate form-aldehyde have been proposed to achieve the same effect as formaldehyde itself. Among these are hexamine (hexamethylene-tetramine) and dimethylol urea.

Derivatives of dimethyl hydantoin have recently come under investigation[6] and a patent has been granted[7] to cover the addition of 0·1 to 1·0% monomethylol dimethyl hydantoin to paste and liquid shampoos to inhibit the growth of bacteria and fungi. In this way it is claimed to stabilise colour and odour in products containing anionic sulphates and sulphonates. This preservative is a white crystalline solid melting at 110°C. and is soluble in water and alcohol.

A white formaldehyde resin prepared from dimethyl hydantoin is soluble in water and alcohol and softens at 50°-80°C. The refined grade contains less than 100 p.p.m. of free formaldehyde and is used in aerosol sprays for the hair and in finger-wave lotions by reason of its film-forming properties.

Cosmetic uses of cationics

Those who have occasion to use cationic surface-active agents will find pleasure and profit in reading a paper by P. A. Lincoln[8] in which they will discover explanations for some of the odd phenomena encountered in practice.

The development of cationics has been conditioned by those properties of many compounds of this class which are not exhibited by anionics to any marked extent. These properties are mainly (*a*) bactericidal activity, (*b*) adsorptive power and (*c*) ability to fix direct dyestuffs. Mr. Lincoln examines these properties critically and finds that too many generalisations have been made and widely accepted.

(*a*) *Bactericidal activity.* For example, alkyl-dimethyl benzyl ammonium bromides and iodides have been reported to be stronger bactericides than the corresponding chloride, but the differences may disappear if other substances are present which displace and control the ionic equilibrium established in the solution of the original quaternary salt in water alone.

The well-known cosmetic differences between calcium, magnesium, potassium and amine soaps of anionic detergents show the influence of the nature of the non-surface-active ion. In the cationics also the nature of the associated anion contributes to the properties of the compound as a whole and, in the presence of a particular anion, the properties are dictated by the *ionic equilibrium* which results.

In passing it is well known that bactericidal test techniques influence the results and *in vitro* tests bear no relation to those obtained *in vivo*.

In this paper different methods of synthesis of quaternary compounds are examined and assessed by the ease of purification and the degree of purity attainable in the commercial product, and it is made clear that here is an important factor leading to discrepancies in reports of bactericidal and other properties by different workers.

(*b*) *Adsorptive properties.* One of the most striking properties of the quaternary compounds in relation to cosmetic uses is their strong adsorption on hair, giving body to fine hair and softening coarse hair. The adsorbed film also acts as a lubricant and reduces the electrical charges produced by combing. For this reason the cationics are frequently used in permanent waving, at some stage in the procedure, in waving lotions and as conditioning agents after shampooing. The cationics cannot compete in price with anionics and the conditioning treatment is preferred as a separate operation.

One may add here that the properties of a cationic surface-active agent must always be considered in relation to the particular product in which it is to be incorporated. For example, in a hair-conditioning cream or in a barrier cream to be applied to the skin, a commercial cationic of only moderate solubility containing a high proportion of inorganic electrolyte, particularly if it should have an ion in common with the surface active agent, is not a desirable ingredient.

(*c*) *Dyestuff fixation.* Direct dyes are readily washed out by water. The quaternary compounds prevent or reduce this effect and at the same time exercise a levelling and restraining effect in colouring so that they have achieved fairly wide popularity in colour rinses, especially in those of the shampoo type. A warning is given that a change of shade is frequently produced and this must be anticipated in formulation. The alkyl pyridinium salts appear to be most popular for this purpose, but several quaternary ammonium compounds are in use.

The generalisation which describes cationic and anionic surface-agents as " incompatible " is found to be too sweeping. That some cationics will react with some anionics and other anions of high molecular weight to form poorly ionised, very insoluble compounds of little value is true, but some virtues have been claimed for some products containing mixtures of appropriate cationic and anionic surface-active agents.

(*Turn to page* 76)

DISINFECTANTS and Disinfection

Sea water bactericide • Properdin • Plant antibacterials
Disinfectants in hard water • Liesegang rings

By A. H. Walters, F.I.M.L.T., M.R.S.H., M.I.BIOL.

Bactericidal agent in sea water

THE toxicity of sea water towards *Esch. coli* has been demonstrated in several parts of the world. From New Zealand comes news of further work in which it was found that this micro-organism will survive and actively multiply in sea water containing a very small addition of lactose broth.[1] Later, well-washed cultures of *Esch. coli* were sown in mixtures of sea water plus the individual constituents of lactose broth. Results showed that the active antibacterial agent appeared to be neutralised by meat extract and also yeast. Further selective tests using amino-acids, vitamins, purines and pyrimidine bases, etc. indicated that cysteine in low concentration gave protection to bacteria suspended in sea water. This result indicated that the toxic agent in sea water may be involved in sulphur metabolism or else disrupts the sulphydryl groups of essential enzymes. It was therefore thought that the presence of iodates in sea water might cause the antibacterial action to *Esch. coli*, and, if so, cysteine could be expected to act as a neutraliser.

In the coastal waters local to Wellington it was found that the iodate content of sea water ranged from nil on polluted beaches to 0·034 p.p.m., a strength, it is claimed, which has an oxidising power equal to 0·15 p.p.m. free iodine. The author postulates that iodate is the antibacterial agent in sea water on the grounds:

(*a*) the universal distribution of this toxic agent throughout the oceans,
(*b*) variable degree of destruction by autoclaving, the iodate reacting according to amount of organic matter present,
(*c*) apparent protection of bacteria by cysteine.

The author also suggests that chlorination is not the main toxic process.

It seems possible that, as well as chlorine and iodine, a number of other substances may play a part according to circumstances.

Properdin and burn infection

The mechanics of natural disinfection are always fascinating and the more that is known about them the better may we be able to aid them. Properdin, first described in 1954, is a serum protein fraction which shows bactericidal activity in the presence of complement and magnesium ions. It can be removed from human blood serum by absorption with an extract of yeast cells.

When so treated serum shows a decreased bactericidal power for certain Gram-negative bacteria, but when properdin is added again the serum partially regains its antibacterial power.

In more recent work properdin concentration was estimated in the sera of 18 burned patients and also 12 normal persons.[2] Within the limitations imposed by the experimental assay method used there was evidence that the properdin levels in the burned patients' sera were below normal. The antibacterial effect of serum containing properdin was tested on six strains of *Proteus*, five of *Bact. coli*, four of *Ps. pyocyanea* and four of *Klebsiella* isolated from burns. Three strains of *Bact. coli* and one strain of *Proteus* were inhibited or killed by the properdin-containing serum, but there was little or no effect on the other strains.

The authors concluded that properdin cannot be expected to kill the flora in established burn infections. It is refreshing to find negative research so thoroughly done and so well reported. Whether effects *in vitro* can be translated so certainly without some *in vivo* experiments may be open to question. One interesting point was the need for magnesium ions, and in view of the buffer solutions employed and their *p*H one wonders if the metal was immobilised during these experiments.

Antibacterials from flowering plants

By testing aqueous extracts of over 1,000 Australian plants, 60 have been found to be antibacterial, and further tests on alcoholic extracts have yielded a slightly higher crop of "positives," but even so these tests seemed relatively insensitive. So a new test — the direct plate test — was devised which gave numerous positive results not detected by the extraction method.[3] Tryptic digest agar was seeded with the test organism and poured into petri dishes. A small piece of the required part of the dried plant was placed on the agar surface, perhaps four or five different specimens per dish. Plants were also ground up and placed in small piles on the agar surface. After 18 hr. incubation at 37°C. the dishes were examined for growth inhibition zones. The test organisms were *S. typhi* S76, *Staph. aureus* B.313 and *Myco. phlei* CSL.

Results indicated that 75 out of 124 dried Australian plants showed antibacterial activity against one or more of the three organisms tested. The most active were the Rutaceæ and the least active Leguminosæ. Strong antibacterial activity was detected in nut kernels of *Cycas circinalis*, the root of *Plum. zeylanica*, and the fruit of *Rhodomyrtus macrocarpa*, the leaves and branchlets of *Flindersia xanthoxyla*, and the bark of *Lungsia amara*.

These results will be of interest to many, but the surface testing method is hardly new. The time of incubation for *M. phlei* seemed rather short, but perhaps there were reasons for this. Your reviewer's grandmother had great faith in geranium leaves (of which she kept a store) which were dried, chopped up and put on to cuts to prevent them going septic. Science seems to be catching up with folk lore!

Disinfectant activity in hard water

Most studies on the effects of hard water on disinfectant activity have been concerned with Q.A.Cs. An attempt has now been made to

compare the effects of a synthetic hard water on certain Q.A.Cs and certain phenolics.[4] A surface film test was used. Stainless steel 1 in. squares were contaminated with a staphylococcus, salmonella and trichophyton, dried, and exposed to disinfectant dilutions for 10 min. at 20°C. In this experimental series only the recovery of staphylococci was attempted. The synthetic hard water contained 0·054% $NaHCO_3$ and 0·036% $CaCl_2$ in distilled water. Using this water, tests were made with and without serum. Four phenolics, two quaternaries and a quaternary detergent steriliser were used and replicate tests were done in duplicate in both hard water and distilled water. Two end points were calculated for each germicide, 99·9 and 99·99% kill, the latter giving more critical information.

Results showed in the authors' view that all the formulations tested in the absence of serum proved refractory to hard water inactivation. In the presence of serum similar results were obtained except with one phenolic. The authors conclude that, with their surface film technique, formulation concentrations required to achieve 99·9% kill are strong enough to mask any finer differences which the use of hard water might make. Results at 99·99% tended to confirm this conclusion. Two phenolic formulations showed a greater tendency to be inactivated than the others. It was observed that these two formulations had less surface activity, wetting and detergency than the others.

The authors obviously intended this as an essay in applied bacteriology. The work of Maurice[5] does not appear to have come to their notice. Using an academic technique, he observed that " end-point experiments showed an increase of approximately 250% in the sterilisation time of organisms suspended in 1·15% phenol in the presence of $5 + 10^{-5}$M potash alum or $5+10^{-5}$ calcium chloride as compared with suspensions in distilled water. This suggests an increased permeability is one factor that can cause death of the organism." Observation of conditions under which micro-organisms die is important, the reasons why they die even more so. Perhaps the Americans are too preoccupied with the former, and the British with the latter. A review on the mutual effects of antimicrobial compounds and metallic cations has also been published.[6]

" Liesegang-like " rings in disinfection tests

Various phenomena associated with inhibition zone tests have often been commented upon and the factors responsible for the size of zone, how clear cut it might be, and so on, have been clearly enumerated.[7] One further phenomenon has not been widely discussed in print but frequently observed in laboratories in zones of inhibition broken by concentric corona of growth giving an appearance somewhat similar to Liesegang rings. This appears only when certain antibacterials are being tested under certain conditions. Some specific studies have now been made on such intermittent growth and zone inhibition of bacteria in agar caused by metal ions and chelating agents.[8] The metals used were copper, cobalt iron, zinc, manganese, nickel and molybdenum; the chemicals, five phenanthroline conjugations, diphenylthiocarbazone, and three quinolines including oxine; benzoylacetone, 2 - thenoyltrifluoroacetone, EDTA, and 3,4 dichlorophenylserine; the test organisms, *M. lysodeikticus*, *B. subtilis*, *M. pyogenes* var. *albus*, *T. utilis* and *Asp. niger*. The medium based on Difco broth agar, *p*H 8, either had the metallic chlorides incorporated, or the chelating agents. Filter paper discs were soaked in the required reagent and placed on the requisite agar suitably infected. The dishes were put at 2°C. for 24 to 48 hr. and then incubated at 37°C. or in the case of *A. niger* 27°-30°C. Minor variations of this technique were developed.

Results were recorded on discs with various chelating agents, discs with chelating agents on media containing metal ions, and discs with metal ions on media containing chelating agents. Many demonstrations of multiple rings of growth and inhibition were obtained. In the authors' view, as diffusion from the disc occurs the reaction with the medium depends upon the dissociation constants of the complexes and relative concentrations. The various concentric rings of growth and inhibition are functions of stoichiometric relationships of the chelating agents, differing metal chelate complexes and free metallic ions.

This paper is a little confusing, since two issues are inextricably mixed. Firstly, the production, mechanics, physics and chemistry of multiple growth rings on agar, and secondly the action of chelating agents on micro-organisms. The nature of the experiment probably made this confusion unavoidable, with the result that insufficient evidence was obtained on both scores. Observations on metallic chlorides have already appeared in this review and the issues in the paper now reviewed are by no means clear. The paper, nevertheless, is intensely interesting and one hopes the various lines of research indicated will be separately followed further. The " Liesegang-like " concentric rings of growth and inhibition are, of course, observed with antibacterials other than those concerned in these experiments, although this does not appear to be mentioned by the authors.

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Schimmel catalogue. Schimmel Boehm Ltd. have issued a new catalogue listing prices of perfume compounds, essences and flavours, essential oils, and specialities such as perfume compounds for polishes, and terpeneless oils.

Analytical Chemistry

Pesticides • Surface active agents • Essential oils • Antibiotics • Vitamins • Pharmaceuticals • Drugs • Fine chemicals

By William I. Stephen, B.SC., PH.D., A.R.I.C.

THE analysis of pesticides is assuming very great importance as a result of the variety and toxicity of the substances used for plant protection. Particularly difficult problems are presented in the analysis of plant residues, which involve not only technical difficulties but also many legal and economic ones. The present position, at least as far as the American pesticide industry is concerned, has been highlighted in a recent leading article[1] in *Analytical Chemistry* which summarises several papers presented at a Symposium on Methods for the Analysis of Pesticide Residues during the Spring Meeting of the American Chemical Society. This month's report begins with a discussion of recent methods proposed for a number of newer pest control chemicals.

Pesticides

Hornstein[2] describes a simple procedure for the partial or complete removal of organically-bound chlorine in organic pesticides by percolating an acidified solution of the compound through a column of granulated zinc. The amount of chloride ion produced is a function of the molecular structure and it is determined in the eluate by potentiometric titration with silver. For a particular insecticide, the amount of chloride formed is reproducible. The acaricide Ovex (*p*-chlorophenyl-*p*-chlorobenzenesulphonate) is determined[3] by hydrolysis to *p*-chlorophenol and sodium benzenesulphonate. The former is removed by steam distillation and converted into the nitroso-derivative under controlled conditions. This is measured colorimetrically. Fruit residues analysed in this way show recoveries of 90%, the method being sensitive to less than 5 μg. of Ovex. Japanese workers[4] have studied this same pesticide in commercial form (Sappiran). The hydrolysate containing *p*-chlorophenol is treated with 4-aminophenazone and potassium ferricyanide in a borate buffer (*p*H 9·3) when a red colour is formed the extinction of which is measured at 510 mμ.

Paper chromatographic techniques continue to find application in the separation and identification of organic pesticides. Mitchell describes their use for technical DDT, p,p′-DDT, DDA, DDD, DDE, 4 : 4″- and 2 : 4′-dichloro benzophenone,[5] and for aldrin, dieldrin, DDE, DDT, lindane, methoxychlor, Perthane [1 : 1 : 1-trichloro-2 : 2-di-(p-ethylphenyl)ethane], and Rhothane, (DDD)[6] A method based on the characteristic coloration produced when captan is treated with alkaline resorcinol is used for its determination.[7] The method is useful in the range 3-30 μg.

Bradbury and Standon[8] have studied the determination of BHC in the presence of pentachloro-*cyclo*hexane and have established that Armstrong's earlier method[9] is specific. McDonald and Watson[10] in a study of the quantitative i.r. analyses of mixtures of isomeric or closely related substances discuss the analysis of mixtures of chlorinated insecticides. Accuracies of about 2% are obtained. Barradas[11] has reviewed recent work on the analysis of pyrethrum, and Pucci and Philipp[12] have continued their studies on the active principles of derris with particular reference to the methods of determining rotenone.

Surface-active agents

Holness and Stone[13] have given a systematic scheme for the qualitative analysis of anionic surface-active agents by means of which a particular material can be assigned to one of 21 groups of commercially-available products. The active material is extracted into *tert*-butanol and certain indicator reactions are carried out on the solution. The presence of cationic and non-ionic surfactants as single substances can be confirmed, but a qualitative scheme for these has not yet been developed.

Bennewitz[14] has found that above a critical concentration certain surface-active materials form micelles in solution which can adsorb one component of a dissociated acid-base indicator, and produce an apparent *p*H change. Anionic materials shift the indicators to the acid side, cationic materials shift them to the alkaline side, and non-ionic materials shift indicator acids to the alkaline side, and indicator bases to the acid side. Use of these reactions is made to determine the ionic form of several surface-active agents. Fluorescent indicators, can be used in the titration of cation-active quaternary ammonium salts, bases and amines with sodium lauryl sulphate as titrant.[15] Sodium eosinate is recommended, the titration being effected under U.V. light to a maximum yellowish-green fluorescence.

Essential oils

In a series of papers on the estimation of esters and alcoholic constituents in essential oils, Indian workers[16] have derived various equations by means of which the amount of various constituents of essential oils may be obtained by calculation. The methods have been checked on synthetic mixtures and can be applied to the determination of mixtures of alcohols, alcohols and esters, alcohols, esters and ketones. The methods involve ester-value determinations before and after acetylation or formylation. Procedures are described for the determination of the essential oil, ethanol, and water content of eau de Cologne and perfumes.[17] The essential oil is obtained by dilution of the sample with water and extraction with ether. After drying, the ether solution is mixed with dibutyl phthalate (as fixative) and the ether is removed by evaporation until a constant weight is obtained. The ethanol is determined oxidimetrically after diluting the sample with 2 *N*-sulphuric acid and filtering from the precipitated oil (talc filter). The water is determined by treating the sample with magnesium nitride and determining the evolved ammonia acidimetrically.

Antibiotics

The ion-exchange chromatography of streptomycin on Permutit is used as a means of separating the antibiotic from organic impurities.[18] Displacement from the resin is carried out with a 20% solution of sodium chloride. A new colorimetric method[19] for the determination of erythromycin depends on hydrolysing the antibiotic by standing for 30 min. in dilute sulphuric acid, and after making alkaline, the solution is heated to 100°C. and extracted with chloroform. The extract, on shaking with a saturated solution of boric acid and methyl yellow, develops a yellow colour and on treatment with *N*-sulphuric acid a red aqueous layer is formed with maximum extinction at 508 mμ. Fouchet[20] has investigated the colour reaction of tetracycline, chlorotetracyline and oxytetracycline with concentrated aqueous zinc chloride and has applied it to the determination of the pure antibiotics. Doskocil[21] has based a method for the simultaneous determination of chlorotetracycline and tetracycline on their different rates of inactivation in 0·2 *M*-trisodium phosphate. Equations are presented for calculating the concentrations of the antibiotics based on the extinctions of the solutions at 440 mμ. The descriptions of physical properties and chemical reactions of miamycin, a new antibiotic, have recently been given.[22] The substance is a member of the erythromycin group.

Vitamins

The quantitative chromatographic determination of derivatives of vitamin B has been carried out[23] on paper using a mixture of propanol - 10% formic acid (4 : 1). Pyridoxine, pyridoxal, pyridoxamine and the phosphates of the last two compounds can be located on the paper by exposure to U.V. light, and after elution with 0·1 *N* - hydrochloric acid the compounds are estimated spectrophotometrically. Maiwald and Maske[24] describe suitable chemical methods for the detection of pyridoxine, pyridoxamine, nicotinic acid and nicotinamide after their separation by paper chromatography.

Small amounts of ascorbic acid are determined in aqueous solutions by reaction with a phosphomolybdate reagent and the extinction of the mixture is measured at 825-827 mμ.[25] The amount of ascorbic acid is obtained from a reference curve prepared for 1-30 μg. of the vitamin in a volume of 10 ml. The method is sensitive to 0·5 μg. A study has been made[26] of the paper chromatographic separation of ascorbic acid and its decomposition products in order to establish an exact experimental method. The difficulty of separating ascorbic acid and dehydroascorbic acid is also discussed. Barrera[27] has examined four methods for the determination of ascorbic acid in raw and cooked foodstuffs. A method based on the spectrophotometric determination of the osazones has been modified for this particular application.

Outlines of the various chemical, physicochemical, biochemical and biological methods for the determination of thiamine (vitamin B_1) are given,[28] and modifications to the recommended thiochrome method[29] are proposed, particularly for the analysis of cereal products. A new photometric procedure makes use of 6 - amino - thymol.[30] The thiamine extract containing 20-40 μg. per ml. is treated in acid solution with an alkaline solution of diazotised 6-aminothymol. The extinction of the solution is measured using a Spekker absorptiometer and an OB1 filter. The method is sufficiently accurate for routine work.

Pharmaceuticals

A new volumetric method is suggested for the rapid and accurate determination of sulphonamides.[31] The method is applied to seven common sulphonamides (and is applicable only to those which form insoluble silver salts). The sample (about 200 mg.) is dissolved in warm acetone and magnesium oxide is added. The solution is titrated with standard silver nitrate in the presence of chromate ions until a permanent red colour is formed. A gravimetric procedure can also be applied. Beguin[32] has applied an argentimetric method to the determination of sulphonamides in tablets. Of common excipients, only stearic acid and its soluble salts interfere, and treatment with barium ions is necessary to remove this interference. Rasmussen, Berger and Espersen[33] have carried out several studies on the identification of drugs and pharmaceuticals.

In the paper referred to, sulphonamides are identified by several different methods, including the preparation of acetyl derivatives, determination of equivalent weights by non-aqueous titrimetry and hydrolysis of the sulphonamides to known amines which can be isolated and identified by melting-point data. A further method, applicable to sulphabenzpyrazine, sulphadiazine, sulphadimidine, sulphamerazine and sulphapyrazine, involves pyrolysis of the compound and collection of a sublimate consisting of the amino component of the sulphonamide. This can be identified by conventional means.

Phenacetin can readily be determined[34] in the presence of aspirin, caffeine and codeine by hydrolysis with 10% sulphuric acid. The *p*-phenetidine formed can be determined by titration with sodium nitrite. Methods for the determination of methionine in pharmaceutical products are reviewed;[35] the recommended procedure involves the direct titration of the sulphhydryl group by oxidation with a bromate-bromide solution to the disulphide. The method is suitable for 100-150 mg. samples. A study of the decomposition of acetylsalicylic acid in commercial preparations shows that appreciable amounts of salicylic acid can be formed whether the aspirin is combined with other substances or not.[36] The free salicylic acid is determined colorimetrically, by reaction with ferric iron and subsequent measurement of the red iron complex at 530 mμ. The colorimetry of *iso*-nicotinic acid hydrazide using *p*-dimethylaminobenzaldehyde has been critically examined.[37] The recommended procedure involves extraction of the isoniazid into warm methanol and an aliquot is treated with a solution of the reagent stabilised with sodium nitrite. The extinction of the resultant solution is measured at 525 mμ. The polarography of phenolphthalein in certain pharmaceutical products is effected by extracting the compound with 95% ethanol and diluting the solution with water to give a final concentration of 25% ethanol.[38] For polarography, the solution is acidified and the amount of phenolphthalein evaluated by means of a calibration curve.

An alternative procedure[39] uses glacial acetic acid as solvent for the extraction of the phenolphthalein. For polarography, the solution is adjusted to contain 12·5% of acetone acid and 0·75 *M* sodium acetate. The $E_{\frac{1}{4}}$ value is —0·69

volt against the saturated calomel electrode and the wave height is linearly proportional to the concentration in the range 1×10^{-4}-$7{\cdot}5 \times 10^{-4}$ *M*.

Elementary sulphur in pharmaceutical preparations can be determined by direct titrimetry[40] using sodium cyanide as titrant. The equivalence point is detected using either bromocresol purple or potentiometric indication. The sample containing about 10 mg. of sulphur is dissolved in carbon disulphide and acetone and a small amount of water is added. The solution is titrated with 0·05 *M*-sodium cyanide solution which contains *iso*-propanol.

Drugs

The determination of crystalline reserpine has been effected by titration in non-aqueous solution.[41] The drug, about 30-130 mg., is dissolved in pure glacial acetic acid and titrated with 0·1 *N*-perchloric acid in acetic acid using crystal violet as indicator. For smaller amounts (10-40 mg.), the alkaloid is dissolved in pure chloroform and titrated with 0·005 *N*-*p* toluenesulphonic acid in chloroform using *p*-dimethylaminoazobenzene as indicator. Reichelt[42] recommends a colorimetric method for the determination of reserpine based on the formation of a 1 : 1 addition compound with methyl orange. Wunderlich[43] uses a colorimetric method involving ammonium reineckate for the determination of reserpine in pharmaceutical preparations. Beer's law holds for concentrations below 10^{-4} *M*.

Fischer[44] describes the quantitative analysis of alkaloids by ion exchange with Dowex-2 resin. An aqueous solution of the alkaloid salt is warmed with 10-15 g. of the activated resin and shaken vigorously until a test portion shows the absence of anions. The solution is filtered from the resin and titrated with standard acid to the bromocresol green end-point. Paulsen[45] has given two methods for the non-aqueous titration of apomorphine hydrochloride. In the first, the drug is dissolved in acetic acid with warming. The solution is cooled to 30°C. and treated with 5% mercuric acetate in acetic acid, followed by dilution with dioxan. The resulting blue solution is titrated immediately with 0·1 *N*-perchloric acid in acetic acid until the colour changes to bright red. The second procedure involves the same addition of reagents, but to a cooled solution of the alkaloid. The colourless solution is then titrated in the presence of crystal violet indicator. Similar titrimetric procedures are recommended for determining the purity of ergot alkaloids—ergometrine maleate and ergotamine tartrate.[46]

Complexometry is used for the selective determination of quinine hydrochloride.[47] The alkaloidal salt is dissolved in a 1 : 1 mixture of acetone and benzene and a fresh 0·05 *M*-solution of cuprous chloride is added to precipitate the complex, $(C_{20}H_{25}N_2O_2).CuCl_3. \times \text{-}CH_3COCH_3$. This is washed thoroughly with solvent and dissolved in boiling water. The cold solution is then titrated with a standard solution of EDTA in the presence of ammonia and murexide indicator. Cinchonine, quinidine, aspirin, phenacetin, caffeine, ephedrine, codeine and papaverine do not interfere.

Fine chemicals

Feigl and Blohm[48] describe a spot test for the detection of salicylic acid and its esters by making use of their strong blue-violet fluorescence in U.V. light. The volatile nature of methyl or ethyl salicylate allows the separation of salicylic acid from other fluorescent substances to be readily achieved. The test is sensitive to 5μg. of salicylic acid. The acidimetric determination of hexamine has been studied.[49] In aqueous solution or in 50% acetone, it can be titrated with 0·1 *N*-hydrochloric acid using antimony as an indicator electrode. Ammonia, if present, is also determined. The dissociation constant of hexamine, K_6, is found to be 8×10^{-10}.

The micro determination of coumarin in vegetable material involves extraction of a dried and finely ground sample (20 mg.) with chloroform.[50] An aliquot is purified by column chromatography and the chloroform in the eluate is removed. Methanolic potash is added to the residue and the fluorescence of the solution is measured. The standard deviation of 12 determinations having a mean of 1·58% coumarin is ±0·08%.

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NOTES AND NOTIONS

FORBIDDEN JELLY

ROYAL Jelly, that mysterious food of queen bees which is becoming a popular cosmetic ingredient because of its reputed skin beautifying properties, even at £500 per lb., has raised a problem for cosmetic importers in South Africa. Objections to the importation of products containing Royal Jelly have been lodged by the Department of Agriculture in Pretoria, which has pointed out that a 50-year old regulation prohibits the importation of bees, honey or any part of a beehive or anything else that has been in contact with foreign bees. This order is designed to prevent the spread of bee diseases.

The banning of Royal Jelly products on this score seems to be a fantastically rigid application of import regulations. The jelly, which is produced by glands in the head of the "nurse" bee from whence it is fed to the Royal brood, is reputed to have a remarkable resistance to bacterial attack and to have unexplored antiseptic qualities. If this is true it is difficult to imagine how it can carry bee diseases. Nevertheless the South Africans are fully entitled to their own views on this matter. It might give an advantage to South African cosmetic manufacturers because, of course, they can use locally-produced Royal Jelly of which there is an abundance. Could foreign firms overcome the ban by buying the Jelly from South Africa for use in products destined for that market?

TWO-SIDED PROBLEM

EVERYONE thinks that influenza and other epidemics are just fine for the pharmaceutical industry. Obviously manufacturers and retailers of remedies look at things differently from other people—a healthy winter can mean a serious drop in business. But one aspect of epidemics is not often considered—the fact that they affect people working in the pharmaceutical industry just as much as everyone else. The result is that many pharmaceutical factories and chemists' shops have to face periods of heavy demand with depleted staffs.

I was glad to see that Mr. John Hanbury, chairman of Allen and Hanburys, paid a tribute to the forbearance and goodwill of his employees who worked overtime to cope with loss of staff and extra demand during the recent Asian flu epidemic. He did so in his annual report to shareholders, expressing gratitude for the "hardworking, intelligent and efficient manner in which they have carried out their duties during the past 12 months."

SOUNDING SILK

ONE of the oddest uses of that remarkably versatile chemical, glycerin, is to aid the manufacture of silk violin strings. It seems that animal protein in this form is even better for musical purposes than protein in the form of catgut. *Glycerin News* says that the "revolutionary strings are produced on the only silk string making machine in existence." (The latter part of this statement is not at all hard to believe.) Apparently the process begins with the passing of Chinese and Japanese silk strands through a solution of gelatin, glycerin, castor oil and water. Then they are twisted: 100 twists per strand for a bass viol string, 900 for a violin string. Afterwards the strings are shrunk and polished. From the factory at Battle Creek, Michigan, they go all over the world.

HOLIDAY WITH SNEEZES

ONE not inconsiderable advantage of spending a year or so in Antarctica is the strong probability of having a respite from colds—surely the most tiresome and depressing of the diseases of civilisation. Dr. Rainer Goldsmith, the medical officer with the advance party to the expedition led by Dr. Fuchs, confirmed this fairly well-known fact recently. In spite of the extremely hard conditions suffered for a year, in which days above zero F. were rare and nights at −40°F. were common, no one in the party had a cold for a year.

Going to Antarctica may seem a drastic cure for a cold and it is sincerely to be hoped that Dr. Christopher Andrewes and his colleagues at the Common Cold Research Unit, Harvard Hospital, Salisbury, will one day find a more comfortable remedy. Unfortunately—after 11 years of hard work—the secret of the exact type of virus that causes colds still eludes Dr. Andrewes. The question which constantly crops up is whether colds are due to a single agent or many. Is this the same thing as saying that colds are many diseases linked by a common causative agent or group of agents, as was said recently of cancers?

One great problem is that it is impossible to cultivate a common cold virus with regularity. Once this can be done its behaviour and growth can be studied *in vitro*.

Meanwhile a lot more volunteers are needed by Dr. Andrewes to spend ten days at Salisbury trying to catch a cold. In spite of being deliberately exposed to infection, there is a 50-50 chance of *not* catching a cold. Fares up to a maximum of £3 are paid and every volunteer gets 3s. a day pocket money. So if he gets a cold he can at least afford a daily tot of whisky. Married couples are welcome. A postcard to the Medical Superintendent, Harvard Hospital, Salisbury, brings full details.

SAFETY AND SODIUM

SURELY one of the strongest arguments for non-returnable containers is the fact that in spite of many warnings and pleas in the Press chemical manufacturers are still getting back empty Winchesters containing small amounts of sodium wire left after the drying of ether. Naturally suppliers carefully examine all empty bottles which have contained ether, but traces of sodium are difficult to detect, with the result that accidents—some serious—occur in the bottle washing plant.

May and Baker have issued another protest against this carelessness and it is a pleasure to give prominence to it in the hope that everyone concerned will co-operate in removing this blot on the otherwise excellent safety record of the chemical industry. M&B say that when sodium has been used to dry ether any residual metal should be carefully and completely decomposed with a low-boiling alcohol before returning the Winchester. Alternatively anhydrous ether can be purchased.

Cicerone

Water Stills

Apex Construction Ltd. have produced a new range of water stills which, when operated with reasonable care, furnish high-grade pyrogen-free water required for hospital or pharmaceutical work. This range of stills is now fitted with an improved form of vapour baffle which combines features of older impingement and tangential types of vapour baffle. A correctly designed vapour baffle is of great importance in this type of still in which entrainment must be reduced to a minimum. The exterior of these stills is chromium plated and stove enamelled to make cleaning easy.

Level Controller

Developments carried out on their original *Tektor J* level controller have resulted in the introduction by Fielden Electronics Ltd., of their latest model, the *Tektor Major*.

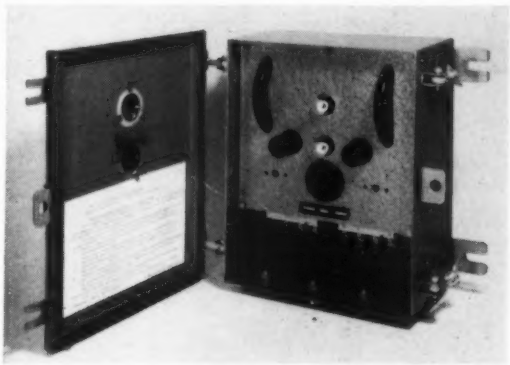
Features of this capacity operated instrument include a calibrated set point control situated inside the case on the front of the chassis which enables the set-point to be easily adjusted on site. Once adjusted, a note may be taken of the reading for future reference. The quick-release chassis can be removed by a simple quarter turn on the holding screws. This facilitates servicing, especially when the unit is situated in an inaccessible position.

The sensitivity of the *Major* is claimed to be better than 1·0 pF under all conditions. Negligible effects ensue from, (*a*) a ±10% change in supply volts; (*b*) an ambient temperature change of from −20°C. to 50°C.; or (*c*) a lapse of time. In the case of the control point the zero drift as a result of these conditions is: (*a*) not more than ±1·0 pF.; (*b*) not more than 2·0 pF (referred to 20°C.); and (*c*) not more than ±1·5 pF.

The relay is of the contactor type, guaranteed switching capacity 440 v. 5 amps. A.C. non-inductive. One pair normally open contacts, one pair normally closed. Contacts are easily replaceable.

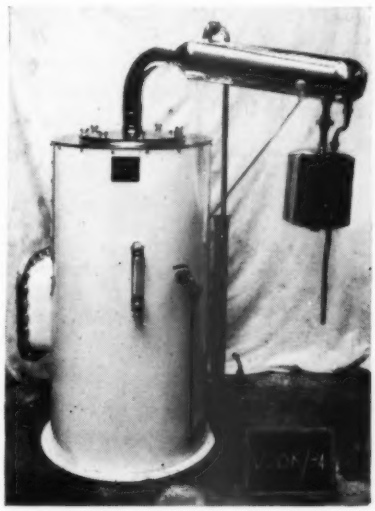
For the high-level model, standard lengths of cable are 6, 12, 20, 30 with 35 ft. max. and for the low-level model 6, 12 and 20 ft. This increase in cable length is considered a great advantage in that the *Major* unit may now be installed some distance away from the probe. A cable selector switch is fitted enabling the appropriate cable length to be accommodated on site. The performance of the instrument is independent of cable length up to the stated maximum.

Tektor Major level controller shewing the quick-release chassis.



A voltage selector switch is fitted, enabling the instrument to be set, on site, for any supply in the 110-125, 220-250 and 380-440 v. ranges, 40-60 c/s. The performance is again guaranteed at any voltage and frequency in this range. There are two long-life indicator lamps, one of which is on at all times.

The instrument is fitted with C.S.A. approved terminal blocks and has a sheet metal weatherproof case. Fail-to-safe facilities are included. The advantages of the capacitance method for level control have been preserved in the *Tektor Major*. For instance, there are no moving parts in the container, direct contact with the material under control is unnecessary and installation is simple. Parallel with the development of the *Major* a new range of electrodes has been designed.



Water still with improved form of vapour baffle.

For further information

on these items

please use the coupon

on p. 92.

New Prism for the Uvispek

The Uvispek spectrophotometer has a new prism. It is made of synthetic fused silica, which according to the makers, Hilger and Watts Ltd., is much more transparent than quartz at wavelengths below about 2,500 Å. As a result it is said to give a very much better ratio between transmitted light and stray light at short wavelengths. It is also claimed to reduce the effect of stray light to negligible proportions at 2,000 Å and well below, and also to extend the range of the instrument down to 1,850 Å.

The Uvispek, which is stated to be already remarkably free from stray light, was designed for interchangeable prisms (primarily to gain the advantage of extra dispersion from a glass prism for the visible region), and the new prism can be used with all but the very earliest models of the instrument. Owners of Uvispeks of series number 303 or later can improve their instruments by acquiring the new prism.

BOOK REVIEWS

Handbook of Chemical Data

Ed. by F. W. Atack. J. Sherratt and Son. 1957. *Pp.* 629. 36*s. net.*

IN THIS handy little book (it measures only 6½ in. by 4 in.) is compressed mainly in tabular form a great store of data for the busy chemist. It is almost impossible to review in the usual sense a collection of facts such as this, so it is best to indicate its scope and range. It contains information on atomic weights, physico-chemical constants, solubilities, refractive indices, dissociation constants, properties of minerals, inorganic and organic compounds, qualitative analysis, volumetric analysis, conversion-tables for weights and measures, hydrometric tables, logarithms, mensuration formulæ and mechanical constants. The editor and his helpers deserve congratulation on their erudition, industry and determination.

Solvent Extraction in Analytical Chemistry

By G. H. Morrison and H. Freiser. Wiley and Chapman and Hall. 1957. *Pp.* 269, *illus.* 54*s. net.*

FROM the wealth of literature on solvent extraction procedures, and their own experience, the authors have produced this book, claimed to be the first comprehensive treatment of solvent extraction as an analytical method. The principles of the subject are discussed at first and a generalised theory is developed. Then apparatus and techniques and other practical aspects are covered. This is followed by a survey of extraction systems and a selection of procedures for the extraction of elements.

The book is a practical working manual for analysts and fills a gap in the literature. It is well printed and pleasant to read.

Rubber

Fundamentals of its science and technology. By Jean Le Bras. Translated by Irene E. Berck. Chemical Publishing Co. Inc. Pp. 464 *inc. index.* 63*s. net.*

THIS is said to be the first book ever published which covers the entire rubber industry, including synthetic elastomers, latices of both natural and synthetic rubber, and even the pertinent plastics, in less than 500 pages.

The author has made judicious selection from the latest developments in rubber chemistry and physics, theories of elasticity, vulcanisation, accelerators, reinforcements, antioxidants, etc., and up-to-date procedures of rubber technology, all of which provides a well-balanced and comprehensive treatise on this important commodity. Special attention has been given to the principles of selecting the most suitable compounding ingredients to meet the specifications placed on the finished product.

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Handbook of Chemistry and Physics

C. D. Hodgman, Ed. 39*th Edn.*, 1957. *Chemical Rubber Publishing Co. and Blackwell, Oxford. Pp.* 3213. £5 *approx.*

THIS is such a well-known book that little need be said about this new edition except that it has been extensively revised and contains over 100 pages of new material. The fact that the index takes 40 pages of fine print indicates the extent of the information given; even taking 40 pages the index is not excessively detailed. The book contains the following sections, each comprising a volume in itself: Mathematical Tables, Properties and Physical Constants, General Chemical Tables, Specific Gravity and Properties of Matter, Heat, Hygrometric and Barometric Tables, Sound, Electricity and Magnetism, Light, Quantities and Units, and Miscellaneous. Each section is separated by a thick page listing the contents. This improves the handling properties of the book which, because of its 3,000-odd pages, is printed on India paper. Even so, the pages tend to stick together, and someone in a hurry can experience the exasperation of trying to leaf through 3,000 cigarette papers. Is it still desirable to produce such enormous compilations? Would it not be better to divide it into, say, three volumes, increase the page size to octavo and use thicker paper? Obviously the three volumes together would cost more than £5, but the extra would be deemed by most people money well spent. Also, separate volumes might sell better to people who do not want all the information in the single volume.

ESSENTIAL OILS FROM INDIAN HEMP

On distillation with water the leaves and flowering heads of Indian *Cannabis sativa* Linn. or Indian hashish give a light essential oil which differs in many ways from the heavy essential oil obtained by steam distillation at a moderately high temperature and pressure. Light cannabis oil consists mainly of terpenes among which the following have been isolated and identified: *p*-cymene, *p*-cymedene, myrcene, dipentene and caryophyllene. The higher boiling portions of the oil consisted of unidentified sesquiterpenes and sesquiterpenes alcohols. Heavy cannabis oil consists mainly of unidentified sesquiterpenes and sesquiterpene alcohols which are apparently the same as in light cannabis oil. Only about one-third of the oil consists of low-boiling terpenes. Essential oils are also present in the three narcotic drugs prepared from the leaves and flowering heads of *Cannabis sativa*, namely *Bhang*, *Charas* and *Ganja*.

The work was done partly in Delhi University and is described by S. Dutt in the *Indian Soap Journal*, 1957, **22**, 242.

ANALYTICAL CHEMISTRY

(*Continued from page* 79)

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News . . .

Britain's competitive chemical industry

A.B.C.M. Chairman has no fears of free trade

"HAVING received 30 years of tariff protection, the industry is now so well established that we believe we are capable of standing up to the competition of any country in the world in quality, price and delivery." This was stated by Mr. Bernard Hickson, chairman of the Association of British Chemical Manufacturers, in giving his support to the idea of Britain entering the European Free Trade Area. In 1957, he said, the British chemical industry exported at the rate of £270 million p.a., accounting for more than 9% of all British manufactured goods exports.

Since 1948, continued Mr. Hickson, writing a year-end review in *Chemical and Engineering News*, the industry's index of production has doubled and the gross turnover today is over £1·4 billion. Since 1945 the industry has invested £500 million in new factories and plant. The petrochemical sector is the second largest in the world and by the end of this year a total of £90 million will have been spent on its development.

Record drug exports. In support of Mr. Hickson comes the news of a record for British drug exports in 1957—of £39·6 million, compared with £35·9 million in 1956 and £12·8 million in 1946.

In 1957 antibiotics accounted for nearly £9 million; miscellaneous proprietary medicines (including those for supply on prescription) accounted for nearly £11 million and vitamins for over £3 million. Exports of aspirin tablets exceeded 780,000,000. Synthetic anti-malarials, alkaloids, barbiturates, insulin and sulphonamides also made important contributions to the total.

Australia (£3·4 million) and India (£2·9 million) were leading markets for these British exports, followed by New Zealand, South Africa, Nigeria, the Irish Republic and Burma—all taking between £1 million and £2 million. Exports to China also passed the £1 million mark—an increase of over £300,000 on the previous year.

The political situation curtailed exports to Egypt to only £83,000, as compared with £740,000 in 1956 and £1·2 million in 1955. Recent gains in North America were consolidated, exports to Canada and U.S.A. amounting to over £1·5 million.

Evans Medical's Liberian venture

A Certificate of Incorporation has been granted in Monrovia, Liberia, West Africa, to a new subsidiary of Evans Medical Supplies Ltd., Liverpool. The company, to be known as Evans Medical (Liberia) Ltd., came into existence on December 18, 1957, and its principal task will be to implement an agreement signed in August 1957 between the Government of Liberia and Evans Medical, whereby the Liverpool firm were appointed sole purchasing agents throughout the world for an initial period of five years for all pharmaceutical products, dressings and medical equipment required by the Government of Liberia, including the National Public Health Service (*cf.* MANUFACTURING CHEMIST, September 1957, 441).

The first managing director of Evans Medical (Liberia) Ltd. will be Mr. R. H. Hawkins, M.P.S., F.B.O.A., who will shortly be coming to Speke from Auckland, New Zealand, for consultations before taking up residence in Monrovia.

Plans are well advanced for the construction of a building in Monrovia to house the large stocks of pharmaceutical products that will be needed. Special accommodation will be provided for products that require storage at low temperatures.

Allenburys develop overseas companies

Considerable reorganisation of its overseas subsidiaries is being carried out by Allen and Hanburys Ltd. The chairman, Mr. John Hanbury, told shareholders at the A.G.M. that almost all the money raised by the last Ordinary issue will be needed for developing overseas subsidiaries. In Australia a new factory is being built, sales there having risen 225% in four years. In Canada the factory in Toronto, at present leased, is to be acquired and new plant and additional stocks are to be bought. In Nigeria new buildings are required, and similar facilities will be needed in Rhodesia and Nyasaland.

Dealing with events at home, Mr. Hanbury mentioned the new Sterile Products building at Ware (see "M.C." June 1957).

Veterinary interests are being widened and an experimental farm for testing new products has been acquired. The new antibacterial *Dequadin* is being steadily developed. Another new product, *Haliborange* tablets (a presentation of vitamins A, C and D), is being well received, especially in New Zealand and Switzerland.

The Group's net profit went up to £150,158, from £111,781 in 1955-56.

P.C.M.'s new laboratories

Premier Colloid Mills Ltd., in association with their Northern agents, O. O. Robinson (Leeds) Ltd., have recently opened a laboratory at Glebe House, Hollin Lane, Leeds 16, which will give a further service to industry in the Midlands and North of England. It is at the disposal of all firms wishing to test their own materials on P.C.M. machines.

The new laboratory, with the Directors and staffs of Premier Colloid Mills Ltd. and O. O. Robinson Leeds Ltd. L-r: Mr. Prentice, Mr. E. Sutton, Mr. O. O. Robinson, managing director of O. O. Robinson (Leeds) Ltd., Capt. F. J. E. China, chairman, Premier Colloid Mills, Mr. L. P. China, sales director of P. C. M., Mr. J. Mulvaney, and Mr. N. Carter.

Premier Colloid Mills produce a complete range of precision mixers and colloid mills. They welcome requests for demonstrations, experimental tests and technical advice. The Leeds laboratory will greatly assist those firms who find it inconvenient to visit the main laboratory at Walton-on-Thames, where this scheme has been in operation for some time.

First anti-dumping order

The Board of Trade have had under investigation an application made by the United Kingdom manufacturers of silicones for the imposition of an anti-dumping duty on polymethylsiloxane fluids and emulsions imported from France. As a result the Board have made an order, The Anti-Dumping No. 1 Order, 1958, under the Customs Duties (Dumping and Subsidies) Act, 1957, imposing an anti-dumping duty of 4s. per lb. on polymethylsiloxane fluids originating in France and manufactured by the firm known as Société des Usines Chimiques Rhône-Poulenc in order to offset the dumping of these goods in the United Kingdom.

Wellcome extensions

Wellcome Foundation Ltd. are planning to construct an extension to their research laboratories at Frant, Sussex, at a cost of £90,000.

Glasgow distribution centre for Glaxo

Glaxo Laboratories Ltd. have had plans approved in principle to erect packing and distribution premises for pharmaceutical and food products at Blairtummock Road, Glasgow, E.3.

Galenical manufacture to end

Allen and Hanburys Ltd. will, from June 30, discontinue the manufacture and supply of traditional drugs and galenicals. They will, however, continue to supply competitive capsules, injection solutions, pills and tablets, in addition to their increasing range of medical and pharmaceutical specialities.

Explosives firm acquired

Following an approach from the directors of the Colliery Explosives Co. Ltd., of Newton-le-Willows, Lancs., Imperial Chemical Industries Ltd. has acquired the whole of the issued share capital (consisting of 108,000 shares of £1 each) of that company. The new subsidiary, which manufactures various commercial blasting explosive compositions, will be administered by the Nobel Division of I.C.I.

Agents for new repellent

Honeywill and Stein Ltd. have been appointed sole U.K. agents for the diethyl-meta-toluamide manufactured in the United States by the Cowles Chemical Co. of Cleveland, Ohio, and sold under their trade name *Detamide* 95.

This new insect repellent has been described by the U.S. Department of Agriculture as the best all-purpose insect repellent so far developed. Its discovery by the U.S.D.A. was the result of investigations by the U.S. Armed Forces. Prices and technical information may be obtained from Honeywill and Stein Ltd.

Colour makers' officers

The British Colour Makers' Association's officers for 1958 are: *Chairman:* Mr. V. Watson (Cromford Colour Co. Ltd.); *Vice-Chairman:* Mr. G. E. Hillier (J. W. and T. A. Smith Ltd.); *Hon. Treasurer:* Mr. C. G. A. Cowan (Cowan Bros. (Stratford), Ltd.).

Price's Swedish agency

Price's (Bromborough) Ltd., have appointed Axel H. Agren A.B., Gothenburg 2 as the selling agents in Sweden for Price's oleines, stearines, fatty acids and fatty alcohols.

Axel H. Agren, who have been trading since 1887, are particularly well-known in the iron, steel, rubber, plastics and general chemical fields. They have a branch office at Stockholm and warehouses at Gothenburg, Stockholm, Malmo and Norrkoping.

Detergents and Sewage Foam

STILL NO ANSWER

The quantity of synthetic detergents used by the housewife and industry has been increasing at a much slower rate during the last three years, says a report* to the Minister of Housing and Local Government (Mr. Henry Brooke), published on February 4. Unless the composition of these products—of which 34,500 tons were used domestically in 1956—alter substantially, therefore, conditions in sewage works, water supply and rivers caused by their use are not likely to change significantly.

The Standing Technical Committee on Synthetic Detergents, set up in January 1957, is making its first progress report. The Committee was appointed to keep under review difficulties arising in sewage works, rivers and water supply caused by these detergents, and to encourage and assist co-ordination of research by manufacturers and suitable public bodies to avoid or overcome the problems without undue burden on public funds.

Foam on certain rivers, canals and sewage works is still the most spectacular aspect of the problem, says the Committee, which cites the experience of the Docks and Inland Waterways Commission of foaming at certain spots so deep as to reduce materially the chances of rescuing anyone falling into the water. Foam collecting at a weir has been known to blow along streets, and there have been instances in which it has been found rising from sink gulleys in blocks of flats.

Another problem considered by the Committee is the possible effect of anti-foaming agents used at sewage works on effluents and therefore on rivers, and also that of the additives present in the retailed detergent powders. The Water Pollution Research Laboratory is experimenting on the toxicity of detergents to fish and on how they affect re-aeration essential for purification of sewage and maintenance of satisfactory river conditions.

Present ways of dealing with foaming are palliatives rather than cures, says the report. The Committee is satisfied, however, that detergent manufacturers are seriously trying to overcome the difficulties by investigating the feasibility of producing efficient household washing products which can be readily eliminated by present sewage treatment methods.

* Report of the Standing Committee on Synthetic Detergents published by H.M.S.O., price 6d. net.

"On the Old Lines"

The legions of people of all ages whose passion is the railway locomotive will be interested to hear of a new book by Peter Allen, the I.C.I. main board director. Peter Allen has been fascinated by trains since his boyhood. I.C.I.'s far-flung interests now take him to all parts of the world, and in the intervals of business he always contrives to note and photograph the steam locomotive, still working faithfully in its manifold forms and in many remote places.

"On the Old Lines" is to a great extent a picture-book, with photographs on every right-hand page and informal talk and reminiscence on every left. The European section is especially rich on Spain, where many endearingly antiquated machines still survive. Mr. Allen has a gift for conveying not just the character of the locomotives but the atmosphere of the railway itself, and his pages are illumined with curious pieces of information, such as that a locomotive in Western Australia needs as much water as 17,000 sheep, and why Peruvian peasants wear trilby hats.

British Cellophane (N.Z.) Ltd.

British Cellophane Ltd. have formed a New Zealand distributing company.

This company—British Cellophane (N.Z.) Ltd.—will distribute *Cellophane* and B.C.L. polythene films as well as the various wrapping aids marketed by the parent company. It came into full operation on January 1, 1958.

Manufacturing associates of British Cellophane Ltd., are already operating in Canada, Mexico and Sweden, while two other distributing companies serve South Africa and Australia.

Pyrene's acquisition

Products of the Pyrene Co. Ltd. of Brentford will now find a world market outside the United States as the result of an agreement under which the company has acquired additional trade marks, patents, sales and manufacturing rights hitherto owned by the American Pyrene Co. This development will enable the company to develop a substantial export market in South and Central America, and some European countries in areas where trading has until now been restricted.

Mr. Francis Harrison, chairman of the company, was largely responsible for the negotiations.

When Mr. Harrison became chairman six years ago, the company was under American control. In 1953 he visited New York for the purpose of making the British company wholly British and, after meetings with American directors, this was subsequently agreed upon. The American holding, representing a controlling interest of 67%, was purchased for £1,200,000 and made available to the British public.

People

Mr. J. Arthur Reavell, chairman of the Kestner Evaporator and Engineering Co. Ltd., and Mrs. Reavell, left Southampton on January 9 for South Africa and a tour of the Kestner company's offices and works. They are due to return on April 4.

Mr. C. N. Ford, works manager, and **Mr. S. H. A. Hirsch,** B.SC., F.R.I.C., technical sales manager, have been appointed to the board of Vinyl Products Ltd.

Mr. A. S. Jerwood has joined the board of Thomas Morson and Son Ltd. as Financial Director. He retains his appointment as secretary to the company.

Mr. J. L. Heyworth, a director of Unilever, has retired from the board on reaching retirement age. He joined the business in 1910, in Lever Brothers' Foreign Department at Port Sunlight, and was elected to the board of Unilever on January 1, 1938.

Dr. J. E. Taylor (Joseph Crosfield and Sons Ltd.) has been elected a member of A.B.C.M. Council, and **Mr. M. J. C. Hutton-Wilson** (British Chrome and Chemicals Ltd.) has been co-opted to fill the vacancy thus created.

Mr. P. Baines, F.C.C.S., previously company secretary, has been appointed a director of Marchon Products Ltd. and of its associated companies—Solway Chemicals Ltd. and Astoria Shipping and Transport Co. Ltd. His duties will be primarily administrative and will include purchasing. He will continue to hold the appointment of secretary to the three companies.

Mr. A. R. Churchill Spencer has been appointed sales manager of Kolmar Cosmetics (England) Ltd. Mr. Spencer worked for a number of years for an English manufacturer of aromatic chemicals. Before joining Kolmar, he was an executive in the export department of a British company in Hong Kong and in May 1957 made a short survey of the Formosan essential oil industry.

The fertiliser business of Fisons Ltd. has been formed into a separate Division which operates under a Divisional board of directors. In addition to a number of directors of the main board of Fisons Ltd., the following have been appointed to the Fertiliser Divisional Board: **Mr. A. Gillies, Mr. E. R. Milner-Moore,** and **Dr. J. A. Storrow,** the Director of Levington Research Station.

Mr. P. T. Chevallier, a vice-chairman of the company, has been appointed chairman of the Fertiliser Division, **Mr. J. Watson Napier** has been appointed managing director, and **Mr. G. V. K. Burton** assistant managing director.

The Distillers Co. Ltd. has appointed **Mr. R. A. Sawtell** distribution manager of its Chemical Division. He was formerly transport manager of D.C.L. Yeast Division.

Mr. W. S. Duffield has been appointed managing director of Laporte Chemicals (Australia) Pty. Ltd.

Laporte Industries Ltd. have appointed **Mr. Geoffrey Hickson** and **Mr. William Woodhall** directors of the company. Mr. Hickson, who has been managing director of Laporte Chemicals (Australia) Pty Ltd., is returning to the U.K. to take up the position of managing director of Laporte Chemicals Ltd. Mr. Woodhall will continue as managing director of Laporte Titanium Ltd.

Mr. P. D. O'Brien, vice-chairman and managing director of Laporte Industries Ltd., will remain as chairman of Laporte Chemicals Ltd, and Laporte Titanium Ltd. **Mr. B. E. A. Vigers,** assistant managing director of Laporte Industries Ltd., will continue as vice-chairman of Laporte Chemicals Ltd. and Laporte Titanium Ltd.

Dr. K. L. Sutherland, an assistant chief of the Australian Commonwealth Scientific and Industrial Research Organisation, Division of Industrial Chemistry, and leader of its Physical Chemistry Section, has been awarded the H. G. Smith Memorial Medal. The medal is awarded annually to the member of the Royal Australian Chemical Institute who, in the opinion of its council, has contributed most to the development of some branch of chemical science.

Burroughs Wellcome and Co. have appointed **Mr. A. W. Lewis,** M.P.S., their marketing manager, as sales manager of Burroughs Wellcome and Co. (Australia) Ltd. He left for Australia at the end of January. Mr. Lewis joined the company in 1948.

Mr. G. S. Billenness, F.P.S., assistant publicity manager, has been appointed marketing manager in succession to Mr. Lewis.

Mr H. B. Lomas, M.P.S., manager of the sales department (veterinary) and formerly manager of Burroughs Wellcome and Co. (Middle East), is now general sales manager (Veterinary division).

Mr. J. W. Plowman (Dewrance and Co. Ltd.) has been elected chairman of the British Valve Manufacturers' Association for the year 1957/58.

Mr. S. C. Jones, B.SC., has been appointed to the board of Hickson and Welch Ltd. He joined the company in 1940 as a plant chemist.

At the age of 70, **Mr. T. A. McKenna,** chairman of the Staveley Iron and Chemical Co. Ltd., is to retire at the end of February after serving the company for nearly 35 years. He will probably be succeeded by Mr. J. P. Hunt, who is at present managing director.

Dr. John R. Brown, Jr., has been elected a director and vice-president in charge of Colgate-Palmolive's research and development, New York.

Mr. A. Wormald, while remaining commercial director of Fisons Ltd., has been appointed managing director of the Chemical Division, where the following appointments have been made: **Mr. B. D. Thornley** to be chairman of Benger's Ltd.; **Mr. A. Robinson** to be chairman of Whiffen and Sons Ltd.; **Mr. A. S. Woodhams** to be acting chairman of Fisons Chemicals (Export) Ltd.; **Mr. A. Wormald** remains chairman of Fisons Pest Control Ltd. and has also been appointed chairman of Genatosan Ltd.

Mr. Harold Moss, M.P.S., has been elected President of the Proprietary Articles Trade Association. He is a well-known personality in pharmacy and the pharmaceutical trade. He has been a member of the Retail Section of the Council since January 1949, and of its Executive Committee since 1953. In 1955 he was elected a vice president of the Association and chairman of the Retail Section.

The governing board of the National Institute for Research in Nuclear Science have appointed **Dr. T. G. Pickavance** as director of the Institute's High Energy Laboratory at Harwell. Dr. Pickavance is at present deputy head of the General Physics Division of the Atomic Energy Authority's Research Establishment at Harwell.

The laboratory is to be called the Rutherford High Energy Laboratory to commemorate the work of the late Lord Rutherford in the development of nuclear physics. It is being built on a site adjacent to the Atomic Energy Research Establishment and will house the Institute's first large accelerator, a research machine of which the main part is a magnet ring 120 ft. in dia. weighing over 6,000 tons.

OBITUARY

Mr. W. B. H. Gallwey died suddenly on December 14 at his home, at Cobham, Surrey. He was chairman and managing director of Union Carbide Ltd.; chairman, British Acheson Electrodes Ltd. (of Sheffield); chairman and managing director, Gemec Ltd., and Kemet Products Ltd., and a director of Bakelite Ltd. He was born and educated at Newcastle upon Tyne.

Dr. Arthur James Ewins, F.R.S. for many years Director of Research at May and Baker Ltd., died on Christmas Eve after a long illness. He was 75.

During his early years with May and Baker Ltd. he was concerned with the manufacture of neoarsphenamine and this, together with his earlier biochemical background, helped to arouse his interest in chemotherapy which lasted throughout his life. This led ultimately to much research and activity in the field of organic arsenicals and other chemotherapeutic substances.

Perhaps his best-known achievement was the discovery in 1937, with his colleague Phillips, of sulphapyridine or M&B 693, the first chemotherapeutic agent for the treatment of pneumonia. This was followed, in 1938, by the synthesis of sulphathiazole by his co-worker G. Newbery. After this came the discovery of the aromatic diamidines which are curative for trypanosomiasis and leishmaniasis. One of the best known of these, pentamidine, is widely used for the protection of humans against African sleeping sickness.

In 1943, Dr. Ewins was elected a Fellow of the Royal Society. He continued to direct the research organisation which he had built up until his retirement in March 1952.

Mr. Harry Charles Wood, O.B.E., died on December 10, 1957, after a short illness. He was sales director and secretary of Graesser Salicylates Ltd., having been with the company since its origin in 1912.

Scots want hormone statement

The National Farmers' Union of Scotland is showing concern at the lack of a clear statement on the use of hormones in feed. They say: " If there is any real risk to the public, on health or other grounds, from the use of synthetic hormones in the feeding of livestock, the sooner a ban is imposed on the sale and use of these substances, the better." Other bodies have supported the Union's plea for official guidance and any necessary action by the Government.

In the opinion of the Union the continued absence of an authoritative pronouncement by the Government on the subject is inexplicable.

New Products

Tetrahydrothiophene

Robinson Bros Ltd. are producing tetrahydrothiophene on a commercial scale. It is a colourless liquid with a coal-gas-like odour and its chief use is as an odorant for normally odourless hydrocarbon gases to give a warning of accidental escapes. A normal dosage is ½ lb. to 1 lb. per mil.cu.ft./gas.

Robinsons believe they are the first in Britain to make this chemical commercially.

★

Distaquaine improved

A chemically improved form of Distaquaine V is now available as *Distaquaine* V-K tablets, each of which contains the equivalent of 125 mg. penicillin V acid (as potassium salt). The makers, the Distillers Co. (Biochemicals) Ltd., say potassium penicillin V is more soluble and therefore more quicky absorbed than penicillin V acid, resulting in the earlier attainment of peak blood levels and in higher therapeutic concentrations.

A bottle of 100 *Distaquaine* V-K tablets is sold to the trade for 40s. 6d. and retails at 60s. 9d.

★

Skin ointments

The anti-inflammatory properties of certain fractions of glycyrrhetinic acid have been found to be effective in the treatment of certain skin diseases. These fractions are used in *Biosone G.A.* preparations produced by Biorex (Marketing) Ltd. Clinical trials are claimed to have shown that these ointments are especially effective in subacute and chronic dermatoses. The therapeutic value of *Biosone G.A.* is said to have been compared favourably with hydrocortisone.

Biosone G.A. ointment, non-greasy and greasy, is available in 25 g. tubes at 4s. 8d. *Biosone G.A.* ointment with neomycin non-greasy and greasy in 35 g. tubes cost 6s. each.

★

Treatment for ear infections

Burroughs Wellcome and Co. have introduced *Otosporin* drops for the treatment of otitis externa, chronic otitis media and infected mastoid cavities. Each c.c. contains 10,000 units of polymyxin B sulphate (lethal to a range of Gram-negative organisms including *Pseudomonas pyocyanea* and *E. coli*), neomycin sulphate 5 mg. (effective against most strains of *Proteus vulgaris*) and hydrocortisone (free alcohol) 5 mg. (one of the most potent anti-inflammatory agents).

Otosporin drops are claimed to destroy practically all the bacteria commonly found in ear infections.

Synthetic geraniol

Synthetic geraniol is now being produced on a commercial scale by Glidden International C.A., of Nassau, Bahamas.

This is the culmination of a 12-year research programme which now, say Glidden, opens the doors to a range of terpene alcohols and related aromatics. According to Dr. W. David Stallup, vice president of the company's Southern Chemical Division, these products, of which geraniol is an example, are synthesised from turpentine by entirely new methods developed in Glidden's research laboratories. For the first time geraniol is made available in the United States from raw materials entirely of domestic origin and not subject to quality vagaries of soil, climate and locale. Moreover, it is stated, the new route to geraniol assures consumers of supply regularity, price stability and material uniformity.

Geraniol standard is now available in quantity and has a minimum total alcohol content of 98%. While containing the alcohols associated with the product derived from citronella oil, it is free from terpenes and sesquiterpenes. It is confidently expected that this geraniol will be used as a direct replacement of high-quality geraniol produced from citronella oil.

Glidden has arranged with A. Boake, Roberts and Co. Ltd., of London, to manufacture geraniol in Europe. The wide experience of Abrac in the perfumery field has been drawn upon in establishing the olfactory standard required by the soap and perfumery industries, and the same close collaboration in the development of new aromatic products is envisaged.

★

Treatment for metal poisoning

Clinical investigations of Wilson's disease (hepatolenticular degeneration) may be assisted by the introduction of penicillamine, obtained by the controlled degradation of penicillin. Methods of treatment aim at eliminating the metal from the body. Penicillamine, a product of the Distillers Co. (Biochemicals) Ltd., is administered orally in capsule-form and is reported to act by binding the copper in a soluble pencillin-copper complex which is subsequently excreted. Several months' treatment is required before notable changes occur.

Distillers believe that the new drug is capable of reversing the progress of the disease, but study will have to be extended over several years before the possibilities of a cure can be achieved.

Laboratory studies suggest that penicillamine may also be of value in the treatment of toxicity from other

metals, for example, in lead poisoning —an occupational risk in the smelting and tinning industry, the painting trade and pottery glazing. Penicillamine is also under investigation in other countries including Canada, Germany and the U.S.A.

★

Phosphorous insecticide

A new insecticide, *Phosdrin* has been produced to meet the demand for a systemic material which will control aphis and caterpillar and which can be applied to vegetable crops up to as little as three days before marketing. The manufacturers, Shell Chemical Co., state that as *Phosdrin* breaks down rapidly into harmless components after application, crops can be consumed after this period with safety. They claim that *Phosdrin* will also give a rapid and high kill of aphis and caterpillar on top fruit, and is the only organo-phosphorous insecticide to give an effective dual control of these pests.

The new insecticide was discovered by extensive research and trial work in Britain and overseas. It kills by contact, fumigant and systemic action and is economic, rapid and efficient in its results. It may be applied at any time, using either high or low volume spraying equipment. The Ministry of Agriculture have given their approval to the precautions recommended for its safe use. It will be available to farmers this spring, and will cost between 7s. 6d. and 30s. per acre, according to rate of application.

★

Antiseptic lozenges

Imperial Chemical Industries Ltd., Pharmaceuticals Division, have introduced *Savlon* antiseptic lozenges. They contain chlorhexidine, the new I.C.I. antiseptic, and benzocaine B.P., in a pleasantly flavoured lozenge base. It has been reported that when *Savlon* lozenges are sucked at two-hourly intervals a hundred-fold reduction in the oral streptococcal counts is effected. They are a C.F. product and are attractively packed in tubes of 12, retailing at 2s. 6d. Trade price per doz. is 16s. 8d. plus p.t. 5s. per doz.

★

Ataralgesia

An anæsthetic which may find application in accident cases has been developed by Dr. J. T. Butt-Hayward, lecturer at the Medical School of Natal University. At a recent meeting of the South African Medical Congress in Durban he announced that immediately beforehand he had taken a dose of the drug, pethidine-daptazole-pacatal. He then gave a personal demonstration by fixing artery forceps on his right arm and also on his chest, normally a painful procedure, and continued with his lecture. Afterwards he invited prominent anæsthetists to test his pain reactions.

I.C.I.'s new lozenges in their plastic pack.

Application of the drug enables the patient to retain all his faculties, mental and physical, but with no sensation of pain. The advantages of being able to place a person in the state that he was demonstrating might be considerable. The method is called "ataralgesia." Burns and fractures could be rendered painless, and would ease transport and the subsequent operation. It is stated that its use in the South African hospitals has already brought about much economy in time, theatre space and also in the demand on the services of the anæsthetists.

★

Oral diuretic

Merck Sharp and Dohme Ltd. have released their all-purpose non-mercurial diuretic, *Saluric* (chlorothiazide). Though administered orally, it is claimed to be completely free from side-effects and to have no known contra-indications. Other properties claimed are non-toxicity and effectiveness in all stages of œdema.

The drug is presented as 0·5 g. half-scored tablets. A bottle of 100 costs 71s. 3d. (trade price 47s. 6d.), plus purchase tax of 14s. 3d.

★

Rubber anti-oxidant

Monsanto Chemicals Ltd. are now producing in this country *Santovar A*, which, as an anti-oxidant for unvulcanised rubber, is claimed to be superior to anything previously made in Britain. In the past *Santovar A* has been available only from the U.S. It is non-staining, and its main use is in the manufacture of adhesive plasters, insulating tapes and other pressure-sensitive tapes.

Aromatic specialities

Dragoco of Holzminden have added several specialities and perfume oils to their range.

Bulgaryol I/P is a type of the known Bulgaryol but finer and more typical of Bulgarian rose oil. *Lilas GV* 6, a new lilas-version, is said to be especially true to blossoming lilac, and to be particularly favoured in modern slightly flowery perfumes. *Muguet* 6218/5 is a more modern style of Muguet P 6218.

A flowery compound suggesting itself for many perfumes can be found in *Gardenia* 6530. The fragrance and strength of *Civet* 58 is reported to correspond with a good quality genuine civet.

Perfume oils include *Concentrate LD GV* 244, described as an elegant creation in the French style; *Concentrate BR GV* 246, an individual original Fougère, *Concentrate Qu GV* 248, a modern and elegant Chypre oil; and *Poivre GV* 134, "a fancy of the fragrance of black pepper."

★

Chelating agents in detergents

The Andrew Maxwell Division of the Liverpool Borax Co. Ltd. has marketed a range of detergents under the name of *Lamol*, which incorporate a chelating agent which, they say, "locks up" the hardness of water for an indefinite period despite high temperature and alkalinity. During tests the company found that the use of this new medium resulted in a gradual disappearance of scale deposits on crockery and glassware as well as on the washing machines. Heavy tannin was also reported to be rapidly removed while egg residues were completely washed off. It was also observed that various other stubborn stains not usually soluble in hydrochloric acid were completely removed after several washes with the new solution.

Lamol is supplied to industry in cwt. lots at 1s. 8d. and 1s. 11d. per lb., but smaller quantities will be supplied.

★

Cockroach and fly repellent

A new product which is claimed to give increased protection against two different pests—cockroaches and cattle flies—is now available in this country. It is "M.G.K. Repellent 11," and is the result of research by McLaughlin Gormley King Co., of Minneapolis, U.S.A. Its chemical structure is 2,3,4,5,-bis (Δ 2-butylene) tetrahydro furfural. In addition to its repellent effects, it is said to be non-toxic to warm-blooded animals. It is stated to be less toxic even than pyrethrins. Its use is in fact recommended in conjunction with pyrethrins and the resulting product, incorporating the excellent knockdown effect of the latter with the high repellency of "M.G.K. Repellent 11," gives protection of an extremely high order.

News from Abroad

CHINA

Fertiliser output

Output of ammonium sulphate in 1957 is estimated at 755,000 tons. The Chinese claim that when the construction and expansion of eight factories provided for in the first Five-Year-Plan is complete, 1,800,000 tons of nitrogenous and 600,000 tons of phosphate fertilisers will be produced. They admit that the development of the fertiliser industry during the last five years has not kept step with the needs of agriculture.

Chemical and drug plants

Work has started on a chemical plant at Taiyuan in North China. It is to produce sulphuric and hydrochloric acids, caustic soda, liquid chloride, phenol and indigo as well as "666" and D.D.T. for agricultural use. Annual production of phenol is estimated to be sufficient to make 8,000 tons of the synthetic fibre kapron. Construction of two other plants will begin in the same district in the spring, a chemical fertiliser plant for ammonium sulphate, etc., and a pharmaceutical plant for various kinds of drugs, including sulpha drugs, and vitamins. All these factories are being designed and built with Soviet assistance.

DOMINICAN REPUBLIC

Pharmaceutical industry's growth

The pharmaceutical industry in the Dominican Republic is in its early stages. The one company in production, Laboratorio Quimico Dominicano, only came into existence in 1953. Up until then all pharmaceutical products had to be imported, mainly from the United States. Today Laboratorio Quimico concentrates on the home market, but it is reported that in the near future its products may be exported to the West Indies, South America and the United States.

The company has a wide range of products which include tonics, vitamin pills, analgesics, medicines for over-acidity, anæmia, asthma, malaria, fever, antiseptic preparations, tuberculosis medicines, preparations for digestion disorders, skin disorders, cardio-vascular disorders, stimulants, expectorants, eye-drops, hormones, nasal drops, tranquillisers and iodics. For a recent Asian flu epidemic the firm was able to provide increased supplies of a strengthened version of their Cafergina and Quidom expectorant. Raw materials are imported from Germany, Italy and the United States.

Now over 200 items are produced, and soon the company is to manufacture cosmetics. Of these products, great success has been achieved by their magnesia milk, anodynes, tonics and anti-malaria preparations which are used by clinics and public hospitals, by the Dominican Social Services Fund and by the Department of Health and Social Assistance.

In spite of the deep-rooted popularity of overseas products with familiar trademarks, the new Dominican products are gaining the increasing confidence of the public. A £40,000 extension is to be built at Ciudad Trujillo to deal with increased home and future export business.

S. RHODESIA

Fertiliser factory

Work on a new fertiliser factory, near Salisbury, Southern Rhodesia, which will cost about £3,500,000 to construct and equip, is up to schedule and it is expected that production will start in the current year.

Bilharzia theory

After 20 years of experiments, Mr. E. F. Roulet, of Salisbury, Southern Rhodesia, thinks he may be on the track of an answer to the bilharzia scourge. He found that in Barotseland the villagers keep the water in the pools free from bilharzia snails by throwing in pieces of timber from a certain tree. On his return to Barotseland some years ago he, however, failed to find the village where he saw this done, so he began on his own account experimenting with various indigenous trees and plants nearest in colour and bark to those he had remembered seeing in the Barotse pool. The experiments were carried out first in Northern Rhodesia and later at his Salisbury home in a goldfish pool with bilharzia snails caught in local dams and streams. Eventually he found that the acacia group of trees killed the snails, but also killed off small fish and made larger fish crazy. The acacias contain saponin, a poison also found in wattle, wild castor oil, the euphorbia group and mopani. He believed that the ideal answer would be to find some waterweed containing saponin which could be grown in streams and dams. Another possibility is to throw the entire wild castor oil plant into the water instead of just crushed seeds. This ensures that the dissemination of the poison is slow enough to preserve the fish but at the same time to kill off the snails within a few days. Farmers could grow the plant on the very edge of the dams and once a year have to cut and throw in. However, properly conducted tests in a Government laboratory are necessary.

AUSTRALIA

Capital expenditure

In the year to June 30, 1957, new capital expenditure in the chemicals and oil refining industries of Australia amounted to £17,100,000, compared with the peak year of 1953-54, when the total was £43,900,000.

NEW ZEALAND

Royal Jelly industry

Royal Jelly, the concentrated food of queen bees, is being produced commercially in New Zealand. Some of it, valued at about £500 per lb., is being exported by air. A hive of bees with their queen has been on display in an Auckland shop window to draw attention to the use of Royal Jelly in a locally prepared cosmetic cream. No positive claims are made for the rejuvenating properties of the Royal Jelly apart from the fact that the queen bees thrive on it and live much longer than the other bees in the hive.

SOUTH AFRICA

Plant extract for heart disease

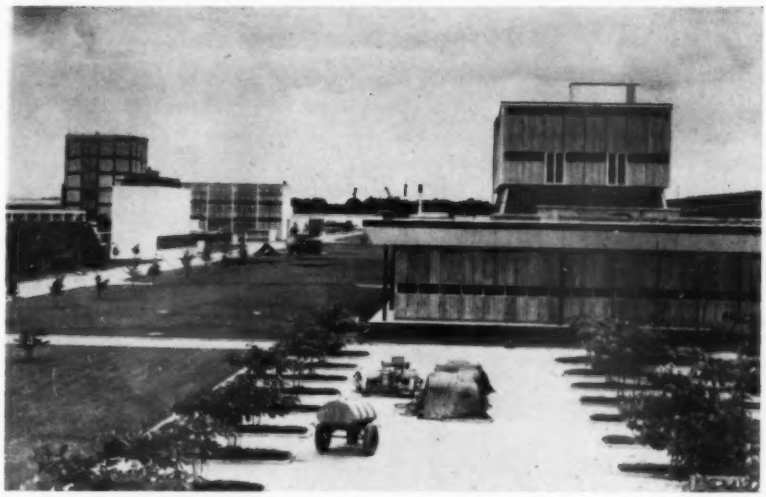
Promising results in the preparation of heart drugs, have been obtained from a South African plant called "Poeierkwasblom."

At the National Heart Institution, New Bethesda, United States, scientists are working on heart drugs extracted from this plant and 30 lb. of bulbs of two South African species have been dispatched to this Institution, said Dr. P. H. B. Talbot, of the Division of Botany of the Department of Agriculture, Pretoria. The Division, in collaboration with Onderstepoort Veterinary Research Laboratories and the Council for Scientific and Industrial Research, is also conducting research into the toxic properties of plants.

Tannin extract factory

The stripping of wattle bark is proceeding satisfactorily after some setbacks due to the extremely wet conditions which temporarily retarded progress. Plantations are thriving and young trees are reported to have shown exceptional growth. Sales of tannin extract are being maintained at a satisfactory level. A new extract factory was opened at Hermannsburg, about 16 miles from Greytown, Natal, in November. It cost a little over £500,000 and can process some 200 tons of wattle bark per working day.

In the first six months of 1957 South Africa exported 27,800,000 lb.



A pharmaceutical industry has been set up in Rangoon for which Evans Medical Supplies Ltd. have provided all the equipment and machinery. They have also undertaken to manage the industry for a period of seven years. The site covers 42 acres and the buildings include a main pharmaceutical building; biological laboratories; an animal farm; a distillery for the production of industrial and medicinal alcohol; and a yeast plant to produce from rice and molasses dry medicinal yeast for the manufacture of vitamin tablets. The photo shows a general view of the factories with the main production building on the right and the alcohol tower on the left.

of wattle bark valued at £301,021, as compared with 36,300,000 lb. valued at £477,213 in the same period of 1956. In the first six months of 1957 the exports of wattle extract were 106,100,000 lb. valued at £2,670,354, as compared with 99,100,000 lb. valued at £2,969,671 in the same period of 1956.

HOLLAND

Soda ash enterprise

In the eastern part of Holland there are large salt deposits, forming the basis for an important salt and electrolysis plant of the Royal Dutch Salt Industry Ltd. The foundation of a soda ash factory in this part of the Netherlands was prevented by the problem of waste disposal.

In 1952 geophysical exploration and drillings in the north-east of Holland resulted in the discovery of a salt dome near Winschoten in the neighbourhood of the seaport of Delfzijl which opened up new possibilities for the erection of a soda ash factory. The salt dome is of large proportions, its height being more than 3,000 ft. The top lies at a depth of about 1,200 ft. below sea level. The salt is recovered by underground leaching. The brine is pumped from Winschoten to a brine-basin near the factory at Delfzijl, over a distance of about 16 miles, through a 12 in. pipeline.

In August 1955 the Dutch Soda Ash Co. Ltd. was founded, the management of which is in the hands of the Royal Dutch Salt Industry Ltd. In the same year the construction of the soda ash plant started at Delfzijl on a site on the sea coast. This site offered the possibility of dealing with the waste problem. The structure of the soil made it necessary to use a foundation for which about 1,500 piles were driven into the soft clay. The length of the piles varied from 20 ft. to 75 ft. The installations have been engineered in co-operation with an American soda ash producer, the Diamond Alkali Co.

Soda ash, being a relatively cheap product, can only bear low freight. Good transport facilities have been secured by the favourable situation of Delfzijl, being a seaport and a canal port. The plant is also connected with the railway system and has a private siding.

The factory will come into operation in the spring of this year. The capital needed for this investment amounted to Hfl. 51 million.

Electrolysis plant

The Royal Dutch Salt Industry is constructing an electrolysis plant adjacent to the soda ash factory. In addition to that the construction of a vacuum salt installation is taken into consideration. When these works are completed a favourable combination of the plants consuming steam (soda ash and vacuum salt) and power (electrolysis) will be achieved, so adding to the overall economies of this new industry.

CHILE

Pfizer opens new plant

The opening of a Pfizer plant in Chile recently was attended by leading representatives of the Chilean government.

Recalling the discovery of many drugs in South America, including digitalis in Chile, Mr. John J. Powers, Jr., president of Pfizer International, stated that Pfizer wished to continue this tradition of research and announced the foundation of the Pfizer Chilean Research Institute. Organised under a permanent board of some of the country's leading scientists, the Institute will develop research programmes for all the territory served by the new plant. One of the first programmes will involve a detailed study of local flora for possible use in producing substances of therapeutic value.

The earthquake-proof buildings of the new factory incorporate the latest features of pharmaceutical plant design. With extensive water-softening and purifying equipment and its own emergency power supply, the factory includes a completely air-conditioned sterile area for compounding drugs and the filling of capsules and vials. Equipped to produce antibiotics and other pharmaceuticals, from tablets to injectables, the plant's capacity is enough to supply outside needs as well as those of Chile itself.

In addition to pharmaceutical and clinical laboratories and a technical library for the use of the Research Institute, other laboratories are planned for pharmacology and bacteriology.

MEXICO

More fertiliser

The Director-General of Nacional Financiera has announced that his organisation, Guanos y Fertilisantes S.A., and the finance house Sociedad Mexicana de Credito Industrial S.A., are joining forces to build a plant at Salamanca to produce 100 tons a day of anhydrous ammonia. Total investment in this plant, to be called Fertilisantes del Bajio S.A., will be 83 million pesos.

In addition Guanos y Fertilisantes is to build a plant at Coatzacoalcos, to produce 150 tons of triple superphosphate and 100 tons of simple superphosphate per day; a plant at Tampico, to produce 150 tons of superphosphates and sulphuric acid per day, and extensions to the Cuatitlan ammonium sulphate plant, to bring its capacity up to 150,000 tons a year. Fertilisantes de Monclova is expected to come into production during the last quarter of 1958 at the rate of 100 tons a day of anhydrous ammonia.

MEETINGS

Institution of Chemical Engineers

February 18. Symposium on Tools of Chemical Production Management. 3 p.m., Reynolds Hall, College of Science and Technology, Manchester. Joint meeting of North Western Branch with Graduates and Students Centres in the North West area.

February 25. "Ion Exchange as a Unit Operation," by R. Kressman. 7 p.m. North Western Branch, Birkenhead Technical College.

March 4. Spring meeting. "A Contribution to the Theory and Practice of Granulation," by Prof. D. M. Newitt and M. Conway-Jones. "Gas Liquid Contacting in Agitated Vessels," by P. H. Calderbank. "The Design of a Simple Mixer Settler. A Method of Design by Calculation giving Automatic Interface Control," by J. A. Williams, L. Lowes and M. C. Tanner. "Heat and Mass Transfer accompanying the Absorption of Ammonia in Water," by G. G. Haselden and S. A. Malaty. Whole day. The Hoare Memorial Hall, Church House, London, S.W.1.

March 5. "The Flow of Granular Materials through Orifices," by R. L. Brown. 6.30 p.m. Midlands Branch, The Midland Institute, Paradise Street, Birmingham.

March 12. "Sulphuric Acid from Anhydrite at Whitehaven," by A. C. Halfpenny. 7 p.m. North Western Branch, Chemistry Department Lecture Theatre, University of Leeds. Joint meeting with Graduate and Students Section.

Royal Institute of Chemistry

February 19. Humphrey Davy lecture, "Purity and Purification of Chemical Substances," by Prof. A. Tiselius. 6.30 p.m. The Royal Institution, 21, Albermarle Street, London, W.1.

March 3. "Careers in Chemistry," 6 p.m. Battersea Grammar School, Abbotswood Road, Streatham, London, S.W.16.

Incorporated Plant Engineers

February 25. "Instrumentation," by J. M. Keating. 7.15 p.m. South Wales Engineers' Institute, Park Place, Cardiff.

February 27. "Atmospheric Pollution in Industry," by W. Herring. 7.30 p.m. Grand Hotel, Sheffield.

Chemical Society

February 18. "Mobility of Adsorbed Molecules," by Prof. R. M. Barrer. 4.45 p.m. Chemistry Theatre, The University, Nottingham. Joint meeting with the University of Nottingham Chemical Society.

February 19. "Recent Progress in the Experimental Study of Cancer," by Prof. A. Haddow. 7.45 p.m. University Chemical Laboratory, Trinity College, Dublin.

February 20. "Reactions of Atoms and Free Radicals," by Prof. J. C. Robb. 5.15 p.m. Chemistry Department, The University, Bristol. Joint meeting with the Student Chemical Society.

February 20. "Recent Developments in Inorganic Stereochemistry," by Prof. R. S. Nyholm. 4.30 p.m. Department of Chemistry, West Mains Road, Edinburgh. Joint meeting with the Royal Institute of Chemistry and the Society of Chemical Industry.

February 21. "Oxidation in Biosynthesis," by Dr. W. D. Ollis. 8.30 p.m. University Chemical Laboratory, Lensfield Road, Cambridge. Joint meeting with the University Chemical Society.

February 21. "Some Problems in the Physics and Chemistry of Graphite," by Prof. A. R. Ubbelohde. 5.15 p.m. Chemistry Department, St. Salvator's College, St. Andrews. Joint meeting with the University Chemical Society.

February 24. "The Shapes of Molecules and Radicals," by Dr. J. W Linnett. 4.30 p.m. The University, Leicester.

February 27. Liversidge lecture. "Some Isothermal Reactions of Free Radicals Studied by Kinetic Spectroscopy," by Prof. R. G. W. Norrish. 7.30 p.m. Anatomy Lecture Theatre, King's College, Strand, London, W.C.2.

February 27. "Some Studies of very Rapid Reactions," by Prof. G. Porter. 6.30 p.m. Chemistry Department, The University, Bristol. Joint meeting with the Royal Institute of Chemistry and the Society of Chemical Industry.

February 27. "Gas Chromatography," by Dr. B. W. Bradford 7.15 p.m. Queen's University, Belfast. Joint meeting with the Royal Institute of Chemistry and the Society of Chemical Industry.

February 28. "Some Adventures in Infrared Spectroscopy," by Dr. N. Sheppard. 6 p.m. Chemistry Department, University College, Swansea. Joint meeting with the University College of Swansea Chemical Society.

March 6. "Some Recent Developments in the Chemistry of the Less Common Elements," by Prof. R. S. Nyholm. 5.45 p.m. Department of Chemistry, University College of North Wales, Bangor. Joint meeting with the University College of North Wales Chemical Society.

March 7. Centenary lecture. "Metalloids and their Compounds with the Alkali Metals," by Prof. W. Klemm. 8.30 p.m. University Chemical Laboratory, Lensfield Road, Cambridge. Joint meeting with the University Chemical Society.

March 7. Bedson Club lecture. "Uses of Radioactive Materials in Industry," by Dr. H. Seligman. 5.30 p.m. Chemistry Department, King's College, Newcastle upon Tyne.

March 10. "Recent Studies of Transient Chemical Intermediates," by Prof. G. Porter. 5.30 p.m. Chemistry Department, University College, Cardiff.

March 11. "Some Aspects of Chemisorption of Gases on Metallic Films," by Dr. F. C. Tomkins. 7.45 p.m. Queen's University, Belfast. Joint meeting with the Royal Institute of Chemistry and the Society of Chemical Industry.

THE CHEMICAL MARKET

ATROPINE AND CODEINE PRICES HARDEN. BORAX DEARER

LONDON.—Pressure on space has forced us to hold over our price list this month. Steep increases are noted for **codeine phosphate** which has jumped from £80 per kg. to £121 2s. 6d., and for **atropine,** of which the sulphate now costs £51 2s. per kg. instead of £36 2s. and the alkaloid £59 18s. instead of £44 19s. **Borax B.P.** is dearer, powder from £56 10s. per ton to £58., and powder extra fine from £57 10s. per ton to £59. **Boric acid B.P.,** crystal, formerly £94 10s. per ton is now £96., powder is £93 10s. per ton from £91., and powder extra fine is £95 10s per ton from £93. **Arsenic** has dropped substantially from between £40 and £45 per ton to between £37 and £38. **Aspirin** is available in 56-lb. lots at 5s. 2d. **Silver nitrate,** formerly 5s. 0$\frac{3}{8}$d. per oz. is now 4s. 11$\frac{15}{16}$d. **Sodium silicate** is quoted at £13 10s. per ton for 4-ton lots, and £15 per ton for 1-ton lots. Gums and waxes fluctuate, **candelilla** declining from £25 10s. per cwt. to £25. All brands of **beeswax** are cheaper so that Dar-es-Salaam spot (nominal) has dropped from £30/cwt. to £29; Sudan spot from £27/cwt. to £26 10s.; bleached white (slab) from £31/cwt. to £30; and refined yellow (slab) from £30/cwt. to £29. **Carnauba** also shows changes, prime spot being £59 10s./cwt. instead of £60 10s., while fatty grey increased from £29 5s./cwt. to £30.

March 14. "Ion-pairing in Strong Electrolytes," by Prof. C. W. Davies. 4.30 p.m. Chemistry Department, The University, Birmingham. Joint meeting with the Birmingham University Chemical Society.

March 14. "Stereochemistry and the Periodic Table," by Prof. R. S. Nyholm. 7.45 p.m. University Chemical Laboratory, Trinity College, Dublin.

Fertiliser Society

February 27. "Gaseous Effluents from Granulation Plants," by F. J. Harris. 2.30 p.m. Lecture Hall of the Geological Society, Burlington House, Piccadilly, London, W.1.

Society of Cosmetic Chemists of Great Britain

March 7. "The Practical Use of Cosmetics," by Miss Eve Gardiner. 7.30 p.m. The Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2.

Royal Society of Arts

February 19. "Rocket Propulsion," by J. E. P. Dunning. 2.30 p.m. The Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2.

February 26. Fernhurst lecture, "Gibberellic Acid; a new plant hormone controlling growth and flowering," by P. W. Brian. 2.30 p.m. The Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2.

Society for Analytical Chemistry

March 13. *Midlands Section.* "The Analytical Chemistry of Synthetic Detergents," by W. B. Smith. 7 p.m. Nottingham.

February 18. *Physical Methods Group.* "Solid Source Mass Spectrometry," Meeting Room of the Chemical Society, Burlington House, London, W.1.

Society of Chemical Industry

Fine Chemicals Group

March 14. "Research on Organotin Compounds and their Technological Applications," by Dr. E. S. Hedges and Dr. G. J. M. Van der Kerk. 6.30 p.m. 14, Belgrave Square, London, S.W.1. Joint meeting with the London Section.

Chemical Engineering Group

February 18. "Industrial Uses of CO_2," by T. B. Philip and R. Hamilton-Peters. 5.30 p.m. 14, Belgrave Square, London, S.W.1.

March 11. "Kachkaroff Process for Sulphuric Acid Manufacture," by F. C. Snelling, and "Constructional Details of a Petersen Tower Sulphuric Acid Plant," by J. P. A. Macdonald. 5.30 p.m. 14, Belgrave Square, London, S.W.1.

Technical Press Review—February

Automation Progress — Continuous Manufacture on Roller Bearings; Russian Work on Translation by Computer; Pointers to Automation in the U.S.S.R.; Numerically Controlled Flame Cutting; Nucleonic Gauge Controls Brass Rolling; Automatic Control of Electro-plating; Pneumatic Handling in Industry.

Atomics—The Dresden Nuclear Power Station; Electromagnetic Pumping of Liquid Metals; A Review of Pumps and Fans.

Corrosion Technology—Influence of Insulation Design on Condensation and Corrosion; High-temperature Hydrogen Sulphide Corrosion in Commercial Sovaformer Units—2; Chemical and Electrochemical Affinities of Corrosion Processes; Underground Corrosion — 2; Behaviour of Protective Coatings in Soils.

Chemical and Process Engineering—Special issue on Production and Chemical Engineering Uses of Rubber (Natural and Synthetic); New Trends in Absorber and Fractionator Tray Design; Silicate Chemicals for Industry; Fresh Water from Sea Water; Big New Aluminium Plant for Canada.

Paint Manufacture — How the Paint Industry handles Materials; Influence of Organic Titanates on the Properties of Paints; Styrenated Epoxy Esters.

Petroleum — Petrochemical Review in Great Britain; Strength of Welds in Carbon Steel; The Petrochemical Industry; The Point of Attack in the Combustion of Hydrocarbons; Davison Catalyst Factory.

World Crops—Pest Control Progress in Locust Research; Blood Tests for Users of Organo-phosphorous Insecticides; Crop Pests make History—the International Congress at Hamburg.

Food Manufacture—Special issue on Canning and Quick Freezing; Canning Asparagus in California; Review of Canning Equipment; Fruit and Vegetables; Ice Cream; Meat.

Dairy Engineering—Special issue on Cleaning in the Dairy; Reclamation of Bottle Washing Detergents; Dairy Maintenance; New Life for Old Bottles.

For specimen copies write to the Publishers at Leonard Hill House, Eden Street, London, N.W.1.

NEW PATENTS

COMPLETE SPECIFICATIONS ACCEPTED

Dyestuffs

Nitro-dyestuffs and process for making them. *Ciba Ltd.* 790,921.

Metallisable monoazo dyestuffs, complex heavy metal compounds thereof, and their use. *Geigy AG, J. R.* 790,904.

Fat-soluble dyestuffs and process for their manufacture. *Ciba Ltd.* 790,797.

Metal complexes of azodyestuffs mixtures. *Sandoz Ltd.* 791,438.

Process for dyeing textile articles made from acrylonitrile containing polymers. *Union Carbide Corporation.* 791,441.

Diazo dyestuffs derived from bis-aminopyrazoles. *Imperial Chemical Industries Ltd.* 791,443.

Manufacture of a vat dyestuff containing sulphur. *Casella Farbwerke Mainkur AG.* 791,498.

Dyeing cellulose acetate textile materials. *Celanese Corporation of America.* 791,392.

Diazo dyestuffs and process for making them. *Ciba Ltd.* 791,164.

Vat dyestuffs of the anthraquinone series. *Casella Farbwerke Mainkur AG.* 791,304.

Manufacture of phthalocyanine pigments and their use. *Geigy A.G.* 791,359.

Fertilisers

Polymerisable organic nitrogeneous compounds. *Imperial Chemical Industries Ltd.* 790,796.

Manufacture of granulated ammonium phosphate fertilisers. *Canadian Industries Ltd.* 790,988.

Manufacture of granulated mixed fertilisers. *R. B. Risk.* 791,004.

Pharmaceuticals

Pharmaceutical preparation and process for making them. *Glenwood Laboratories Inc.* 790,791.

Sulphonamides. *Imperial Chemical Industries Ltd., H. C. Brimelow and C. H. Vasey.* 791,529.

Barbiturate pharmaceutical compositions. *Nicholas Pty. Ltd.* 791,644.

Pharmaceutical products. *Genatosan Ltd.* 791,281.

Alkaloid compounds and process of separating them. *S. B. Penick and Co.* 791,241.

Process for the production of peptides. *Uclaf.* 791,319.

Production of tetracycline by fermentation. *Lepetit Soc. per Azioni.* 790,953.

5-chloro 8-acetoxyquinoline and germicidal compositions thereof. *Solco Ges. für Chemische Laboratorien A.G.* 791,409.

Miscellaneous

Process and plant for continuous steam distillation. *M. Ballestra.* 791,338.

Purifying synthetic ethanol by distillation. *National Petro-Chemicals Corporation.* 791,220.

Method of recovering magnesium salts from sea water. *Dow Chemical Co.* 791,364.

Seed dressing compositions. *Plant Protection Ltd.* 790,910.

Recovery of phthalic acids. *California Research Corporation.* 791,661.

Adhesives. *National Research Developments Corporation.* 791,530.

NEW TRADE MARKS

APPLICATIONS

Pharmaceuticals

SPASTIPAX.—768,068. *Victoria Laboratories Ltd.*

REDIRALT.—768,261. *Cassella Farbwerke Mainkur A.G.*

DERMAPHYTEX.—768,434. *Wynlit Pharmazeutische Produckte A.G.*

HUMEVACTAL. — 768,548. *Parke, Davis and Co.*

COSALDON. — 768,554. *Chemische Werke Albert.*

ORPHENADRINE.—768,648. *N.V. Koninklijke Pharmaceutische Fabrieken V/H Brocades-Stheeman and Pharmacia.*

AN-SKELS.—768,839. *Smith Kendon Ltd.*

VALTORIN.—768,853. *C. H. Boehringer Sohn.*

RIOPAN.—768,932. *Byk-Gulden Lomberg, Chemische Fabrik G. mit Beschränkter Haftung.*

HISCONTRAN. — 769,040. *Imperial Chemical Industries Ltd.*

BAMADEX.—769,060. *American Cyanamid Co.*

COMPITOX.—769,193. *May and Baker Ltd.*

OVESTIN. — 763,311. *Organon Laboratories Ltd.*

MISTOMETER.—765,771. *Bayer Products Ltd.*

TRIOMINIC.—766,094. *A. Wander Ltd.*

ASCALIX.—766,466. *Wallace Manufacturing Chemists Ltd.*

CURIBA.—766,668. *Modern Health Products Ltd.*

PIPRELIX.—766,703. *Boots Pure Drug Co. Ltd.*

RIMIDINE.—766,789; HEXOCIL.—766,790. *Warner-Lambert Pharmaceutical Co.*

PACTABS.—767,375. *Wallace Manufacturing Chemists Ltd.*

TROC.—766,916. *Diva Laboratorium A.G.*

SILVER GRETTES.—767,656. *Brox (Manchester) Ltd.*

ARISTAMIDE.—767,877. *Nordmark-Werke G.m.b.H.*

CETYROL.—767,884. *Macleans Ltd.*

PLACET.—768,105. *British Schering Ltd.*

MAJIPEN.—768,169. *Allen and Hanburys Ltd.*

SOLHYBENATE. — 768,187. *Boots Pure Drug Co. Ltd.*

PANORAMA.—768,186. *Boots Pure Drug Co. Ltd.*

LENIUM.—768,201. *Bayer Products Ltd.*

NEOSPRORIN.—737,436; TRIVAX.—764,121. *Wellcome Foundation Ltd.*

DOLOXENE.—766,442. *Eli Lilly and Co.*

POLYFEN. — 767,107. *Farbwerke Hoechst A.G. Vormals Meister Lucius and Brüning.*

CALVAM.—767,155. *Glaxo Laboratories Ltd.*

ABIADIN.—767,725. *C. H. Boehringer Sohn.*

HALICHOC.—B767,758. *Crookes Laboratories Ltd.*

CHLORMYTOL. — 768,354. *Parke, Davis and Co.*

DEBENDOX.—768,949. *Vick International Ltd.*

HEMIRON.—769,181. *Parke, Davis and Co.*

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MONPHYTOL.—769,423. *Laboratories for Applied Chemistry Ltd.*

TRELOPEN.—769,692. *Glaxo Laboratories Ltd.*

MELPRADOL.—769,810. *Imperial Chemical Industries Ltd.*

PANTIL.—756,080. *Roche Products Ltd.*

ANGIER'S.—762,321. *Bristol-Myers Co. Ltd.*

SPRINGPINK. — B764,916. *Lilia-White (Sales) Ltd.*

VITACHOX.—765,040. *Crookes Laboratories Ltd.*

COMBIXANTHIN.—765,457. *Siegfried A.G.*

ROBAXIN.—766,196. *A. H. Robins Co. Inc.*

INTRAMYCIN. — 766,758; INTRAMYCETIN.—766,759. *Parke, Davis and Co.*

TRASYLOL.—766,759. *Farbenfabriken Bayer A.G.*

LINODOXINE.—767,444. *Chas. Pfizer and Co. Inc.*

New patents are from the *Journal of Patents*; and new trade marks are from the *Trade Marks Journal*. In each case permission to publish has been given by the Controller of Her Majesty's Stationery Office. Each of the publications mentioned is obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2.

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NEW COMPANIES

These particulars of new companies have been extracted from the daily register of Jordan and Sons Ltd., company registration agents, Chancery Lane, London, W.C.2.

Sudzene Ltd. 6.12.57. Manfrs. of and dlrs. in chemicals, gases, disinfectants, etc. £500. Dirs.: K. Rowell and H. R. York.

W. Price (Chemists) Ltd. 6.12.57. 142 Walmer Road, London, W.11. £100. Dir.: W. Price.

Univend Ltd. 9.12.57. 57A High Road, Ilford, Essex. Manfrs. of and dlrs. in detergents, soaps, cleansers, polishes, etc. £100. Dirs.: M. Goodman and G. Farkas.

Solast (Coventry) Ltd. 9.12.57. Morningside, Gibbet Hill, Kenilworth Road, nr. Kenilworth, Warwicks. Chemists and druggists, etc. £100. Dirs.: L. J. Sutton and W. R. Dixon.

T. R. Millman Ltd. 9.12.57. 56 High Street, Egham, Surrey. Chemists, druggists, and librarians, etc. £3,000. Dirs.: T. R. Millman, P. N. Hemmins, C. Scott, Doris M. Gigg and C. G. Millman.

Florasynth Laboratories (England) Ltd. 10.12.57. 22 Manchester Square, London, W.1. Manfrs. of and dlrs. in chemicals, etc. £100. Dirs.: W. Lakritz, J. H. Fein and C. P. Kramer.

Blaise Perfumes Ltd. 18.12.57. 152 High Street North, Dunstable. £750. Dirs.: B. A. and Mrs. I. L. Preston and Marjorie A. A. Robinson.

John McLeod (Cosmetics) Co. Ltd. 11.12.57. 120/122 Seymour Place, Marylebone, London. £1,000. Dirs.: R. J. M. Burghes and Betty L. Burghes.

O. Brooke Chemists Ltd. 12.12.57. £3,000. Subs.: Olive Brooke, 30 York Road, Acomb, York and Mrs. M. I. Knight.

Jack Powell (Old Hill) Ltd. 16.12.57. 293 Halesowen Road, Old Hill, Staffs. To take over bus. of chemist and pharmacist cd. on at Halesowen Road, Old Hill, and 118 Colley Gate, Worcester, as "Jack Powell," etc. £10,000. Dirs.: F. J. and Irene Powell.

Beta Chemicals Ltd. 16.12.57. 43 Westgate, Burnley, Lancs. Manfg. chemists, etc. £1,000. Dirs.: J. B. and Mrs. F. Bowers.

Raymond (Salon Supplies) Ltd. 12.12.57. Manfrs. of preparations used for toilet and beauty treatment, or as cosmetics, etc. £100. Dir.: P. B. Raymond. Subs.: H. S. Dunham, 13 The Gardens, Watford, Herts., and P. R. Altman.

Sixty Years Ago

From MANUFACTURING CHEMIST, February 1898

Oil shop risks

The retail sale of petroleum spirit is officially reported to be diminishing year by year, partly it is believed from the demands of the insurance companies for increased premiums where it is kept upon oilmen's and general dealers' premises, and partly from its almost universal disuse for domestic lighting.

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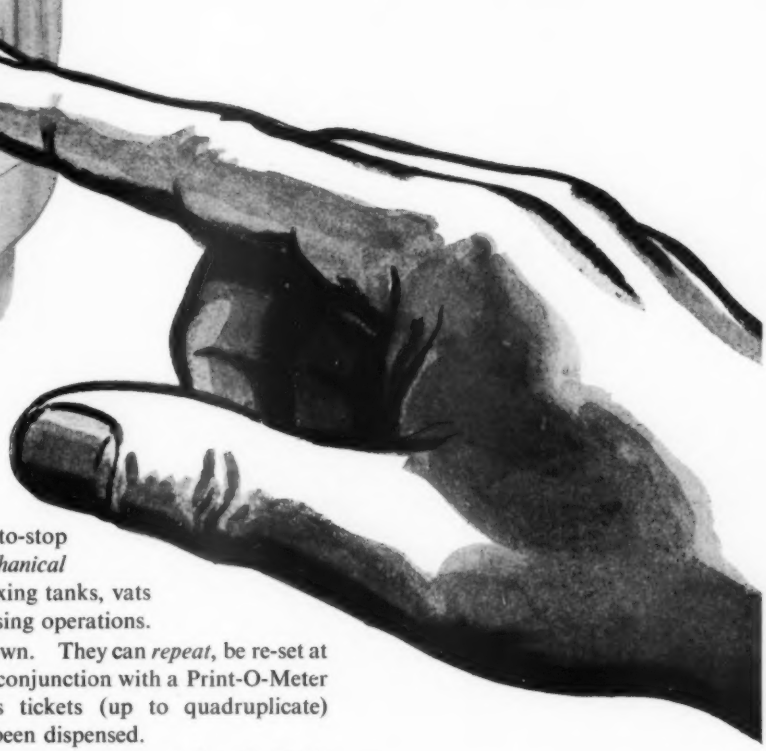

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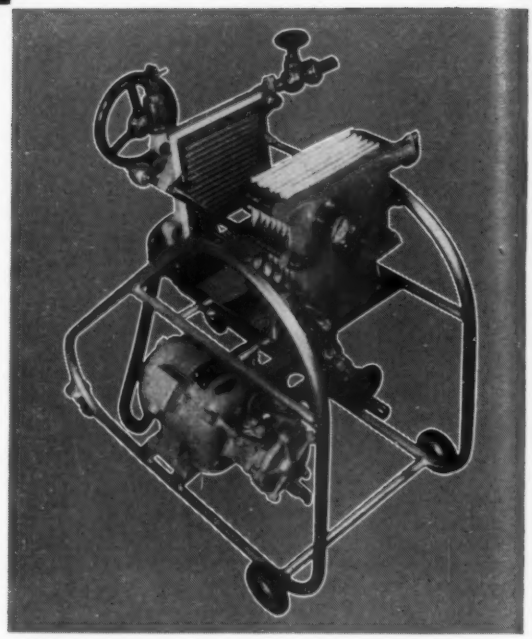
Carlson Original Filter Sheets, together with this filter, form the ideal combination.



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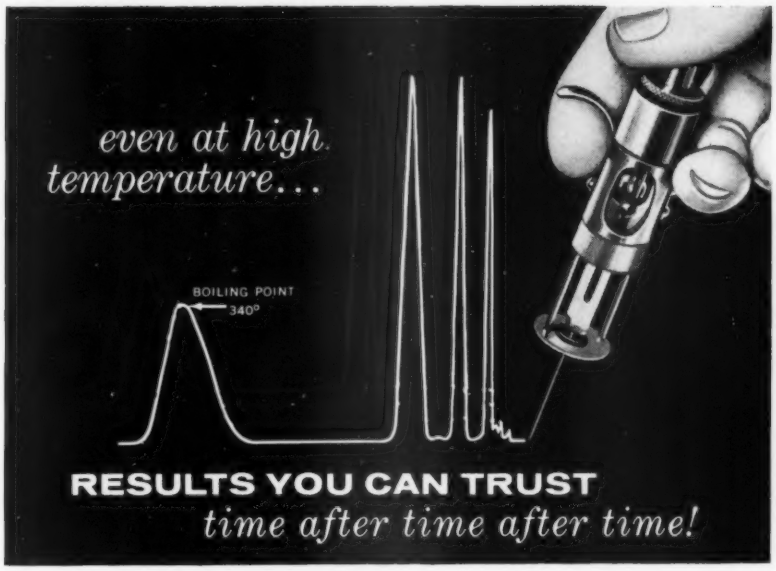

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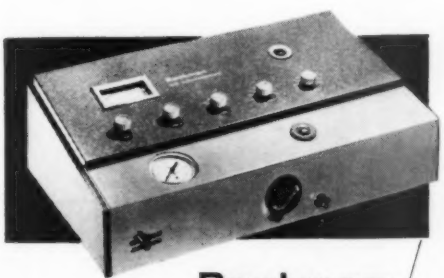
Only the Beckman/GC-2, incorporating superb control of temperature, flow and volume, can give you this mirror-like reproducibility. It turns out analyses you can trust – *every time* – with never a need to double-check results.

- *Reproducible sample introduction.* Beckman Liquid Sampler (illustrated) and precision Gas Sampling Valve insure reproducibility of sample volume and accuracy of quantitative results.
- *Reproducible retention times.* Unique "proportional" temperature control and "dual-capillary" flow regulation combine to standardize elution times, first requirement for positive component identification.
- *Reproducible peak configuration.* Quick, positive action of liquid sampler plus instant vaporization of sample by heated inlet eliminates "rate of addition" problems. Chromatograms with accurate, useful quantitative results are assured.

The Beckman GC-1 *(Model 178) low-temperature gas chromatograph, and its new, wide-temperature-range companion, the GC-2, are available through your Beckman dealer.*



GC-2 features include:

Conduction Heating for fast response to temperature change.

Proportional Temperature Control - Holds entire column at precise temperature setting.

Electronic Eye visually anticipates temperature stability.

Dual-Capillary Flow Regulation eliminates pressure surges.

Easy Column-Interchange

All-AC Operation

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International Division
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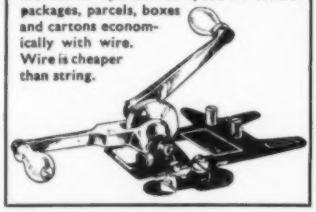
FIRM FIXING AT SPEED—CARTONS KEGS · DRUMS · PACKING CASES, ETC.

ILLUSTRATED below is a new steel-strip banding tool for securing and strengthening bales, packages, crates, cartons and packing cases for shipment. This tool, the LAWCO "Superb" draws upon a twin dispenser carrying two ribbons, say $\frac{5}{16}$" and $\frac{1}{2}$", which experience shows will meet almost all requirements. It is instantly adjustable to use either of two sizes of banding; $\frac{5}{16}$" and $\frac{3}{8}$"; $\frac{5}{16}$" and $\frac{1}{2}$"; or $\frac{3}{8}$" and $\frac{1}{2}$". Simple lever action tensions the banding, secures the joint and cuts off.

MOST "LAWCO" TOOLS SUPPLIED ON MAINTENANCE HIRE AT SMALL WEEKLY RENTAL.

PILFER-PROOF PACKS

Here is another 100% tool that saves money in the Despatch Department and frustrates pilferers. Simple lever movement operates at speed to secure packages, parcels, boxes and cartons economically with wire. Wire is cheaper than string.



On right is illustrated one of our carton stapling machines for firmly fixing "flats" at speed. The practical way of buying and storing cartons is collapsed and flat. Then erecting and metal-stitching for strength. There's no risk of moisture failures when carton bottoms are wire stitched instead of taped. And no risk of pilfering when tops are closed with "Lawco" Plier Stapler.

LAWCO MODEL "A"

The tool for stapling bottoms of deep cartons Strongly; Quickly; Cheaply.

LAWTONS
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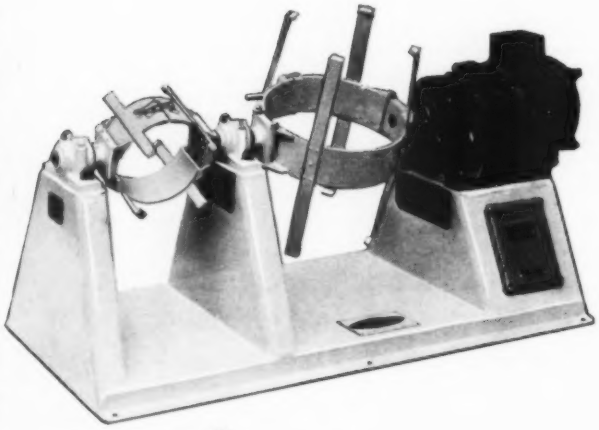
LAWCO

TUMBLEMIX

the perfect blending unit



Chemical Manufacturers in many parts of the world are finding the Tumblemix highly satisfactory for colour dispersion, powder mixing, paint agitating and rejuvenating, etc.

Available in single or double units, the Tumblemix is manufactured in sizes to take drums ranging from 1 to 40 gallons.

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HENEAGE STREET, BRICK LANE, LONDON, E.1

TELEPHONE . . . . . BISHOPSGATE 7314 (5 lines)

"A"
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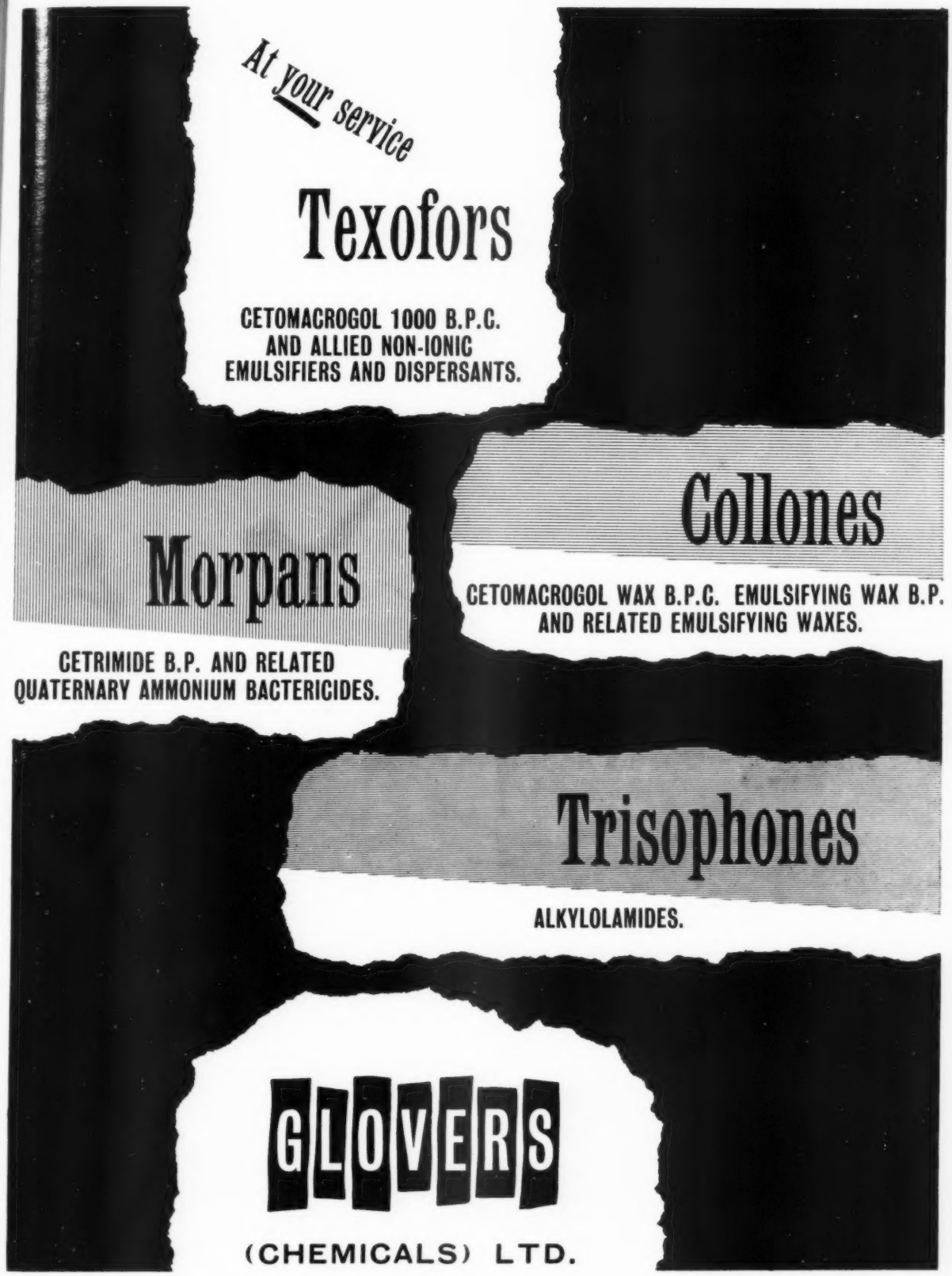

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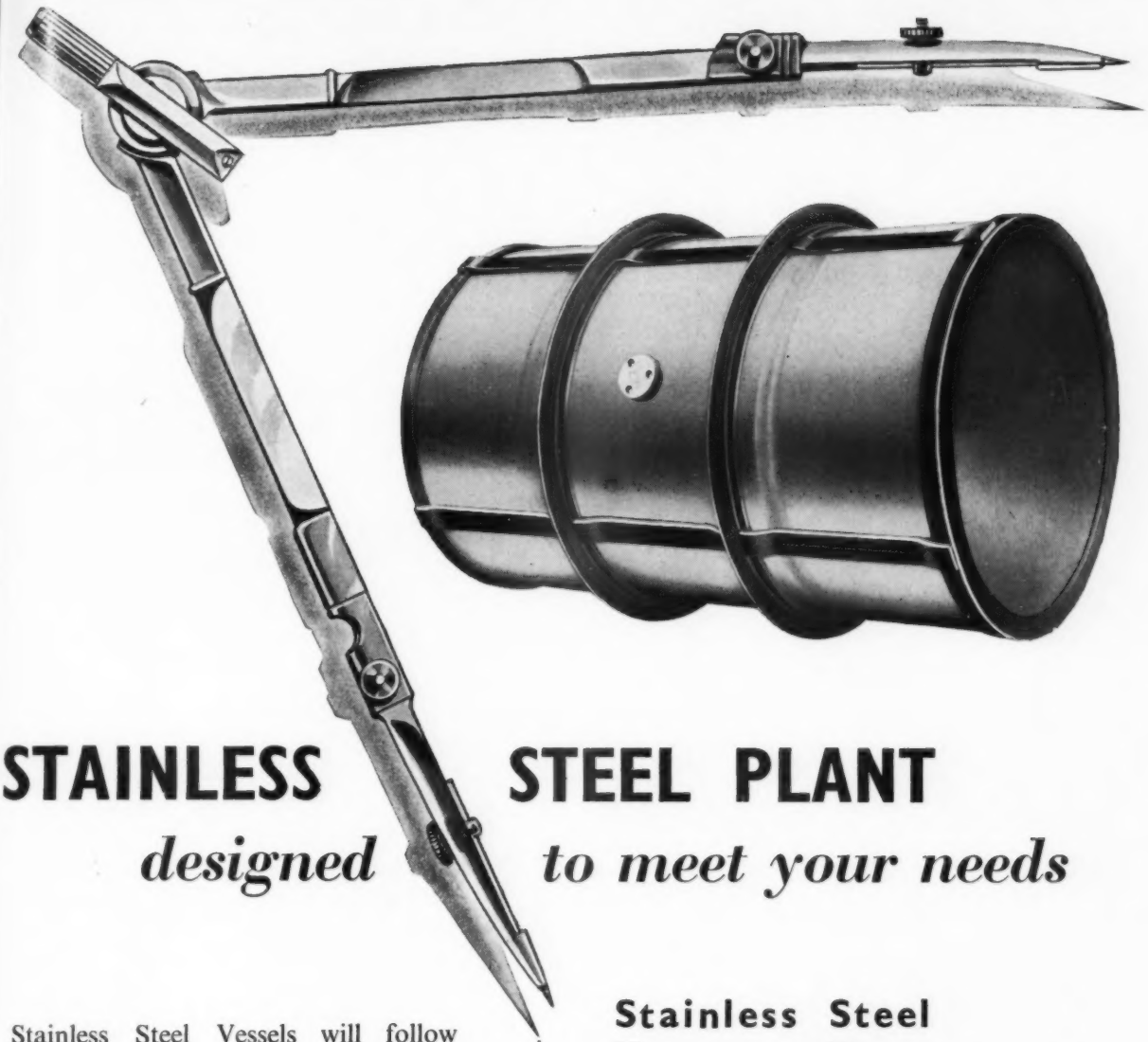

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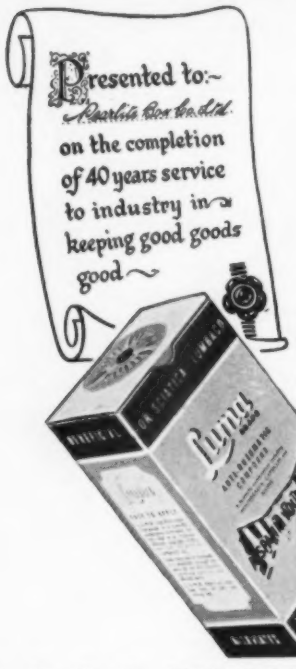

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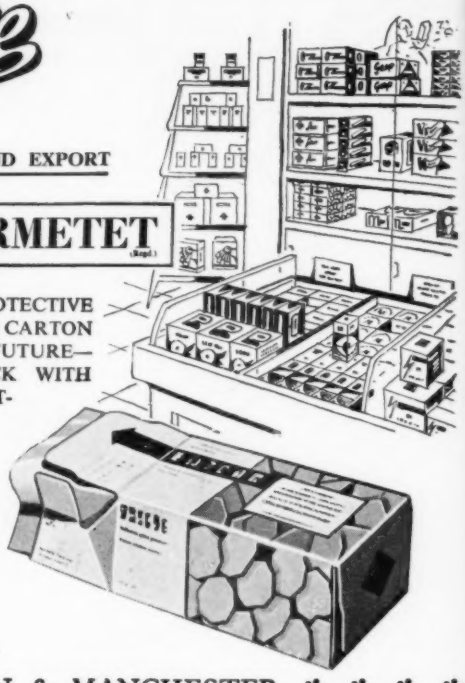

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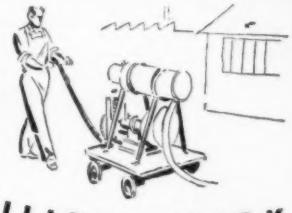

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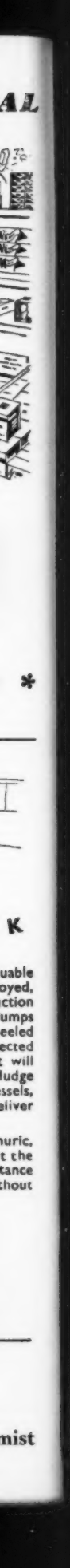

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Approximately 110,000 per litre
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Approximately 23,000 per litre
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Approximately 3,000 per litre

Dixon Gauze Rings combine advantages of the regularly arranged gauze packings with those of the random packings. The packing density and effective area of gauze is high. The H.E.T.P. is small even for large boil-up rates; the hold-up per theoretical plate is small, and the packing can be used satisfactorily under reduced pressure.

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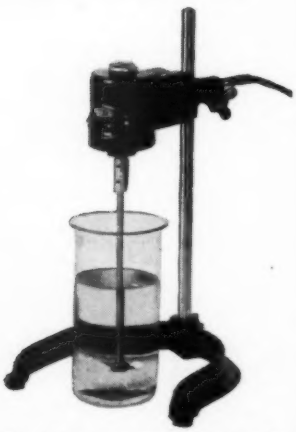

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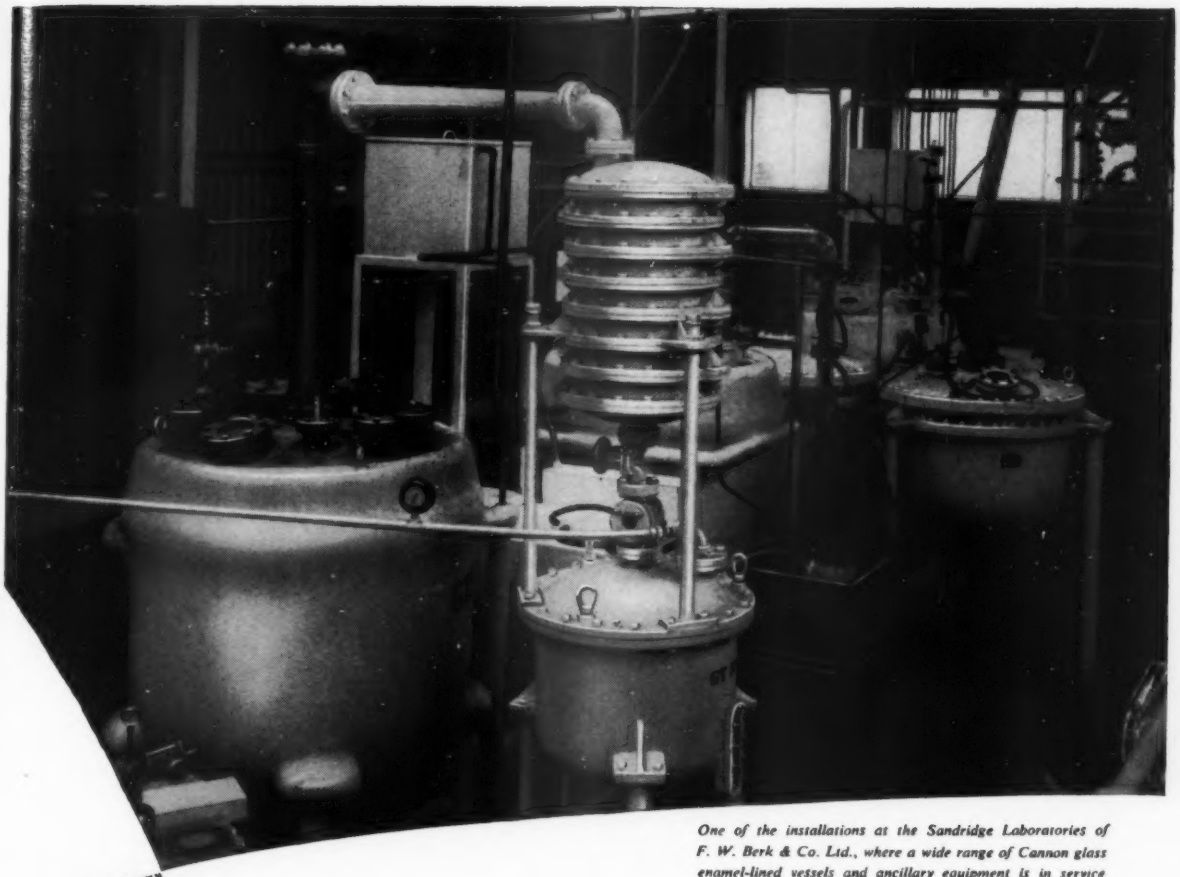

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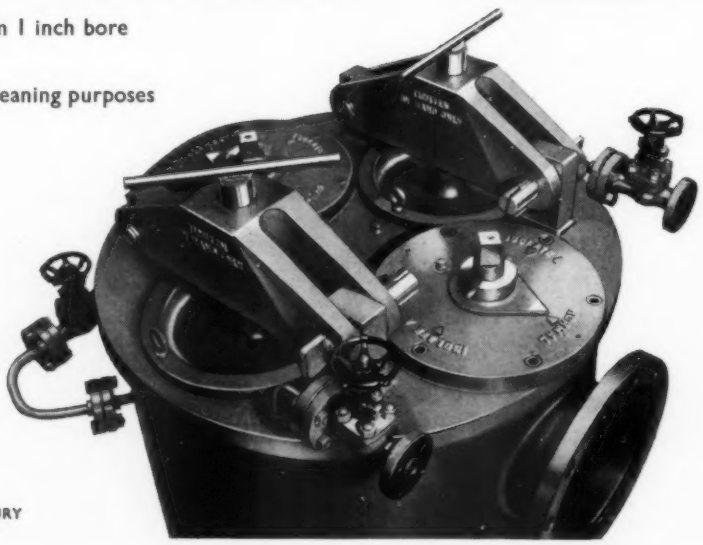

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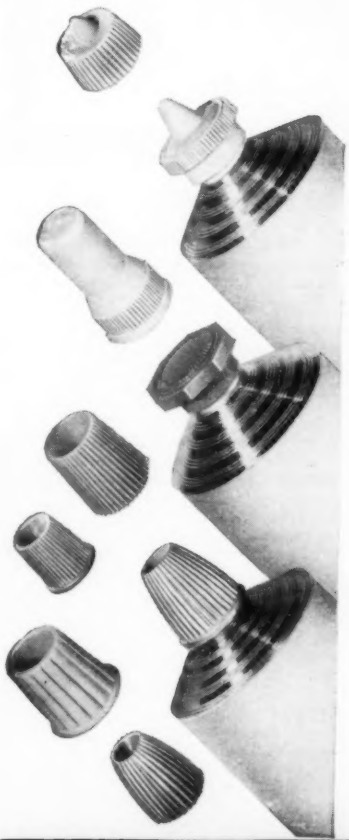

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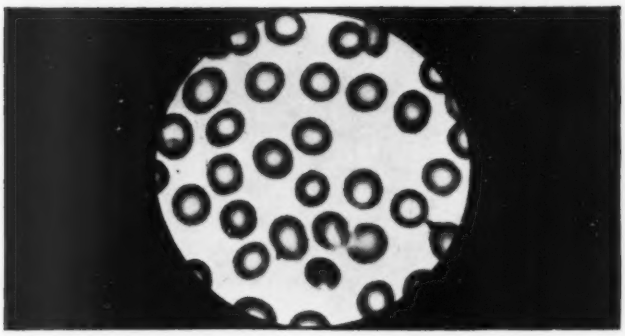
These materials are readily available from stocks in London. Further details will be supplied upon application

Photomicrograph of blood cells



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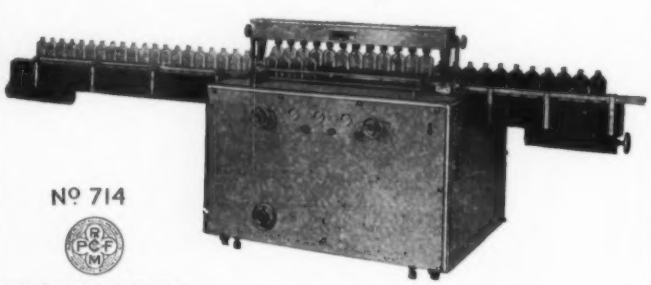

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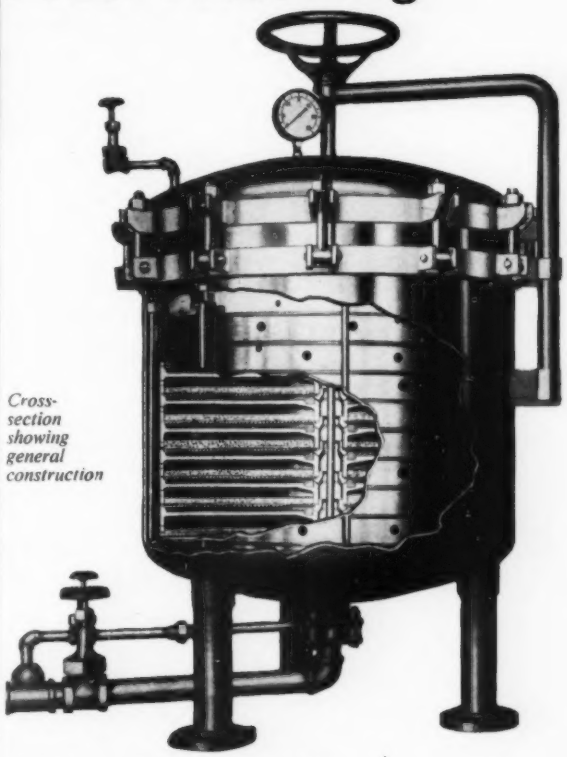

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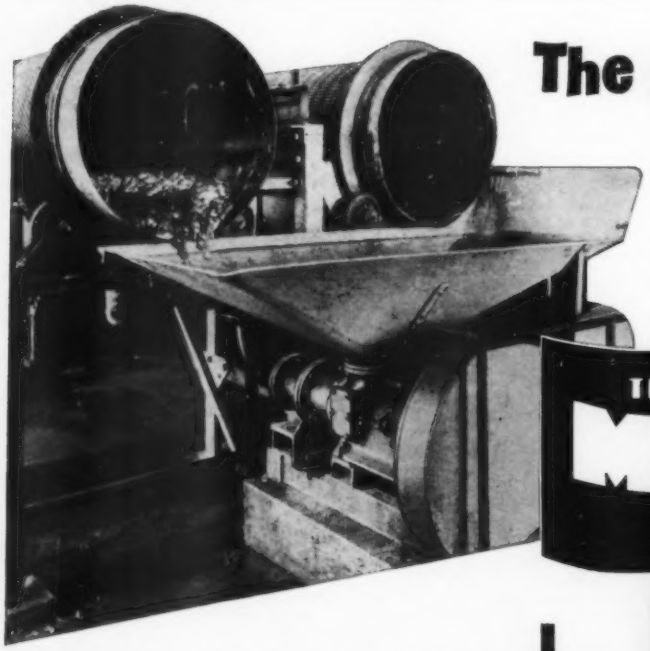

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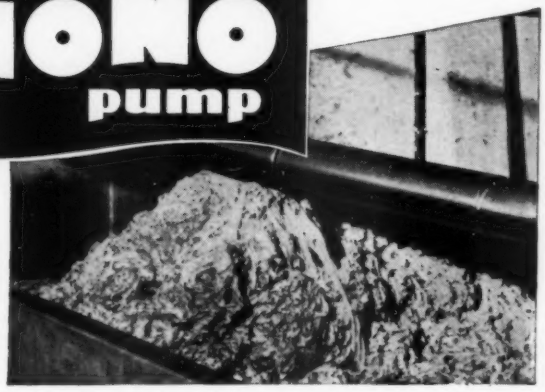

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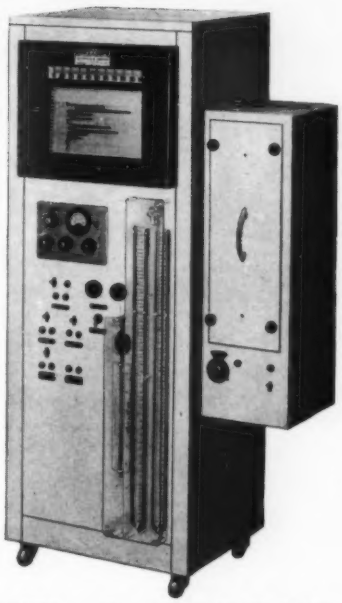

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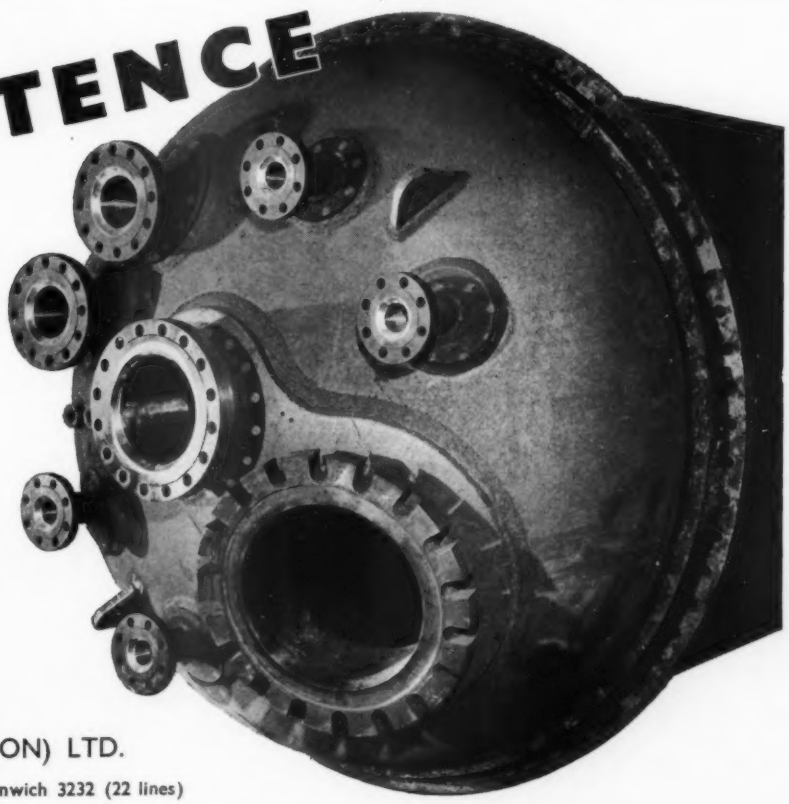

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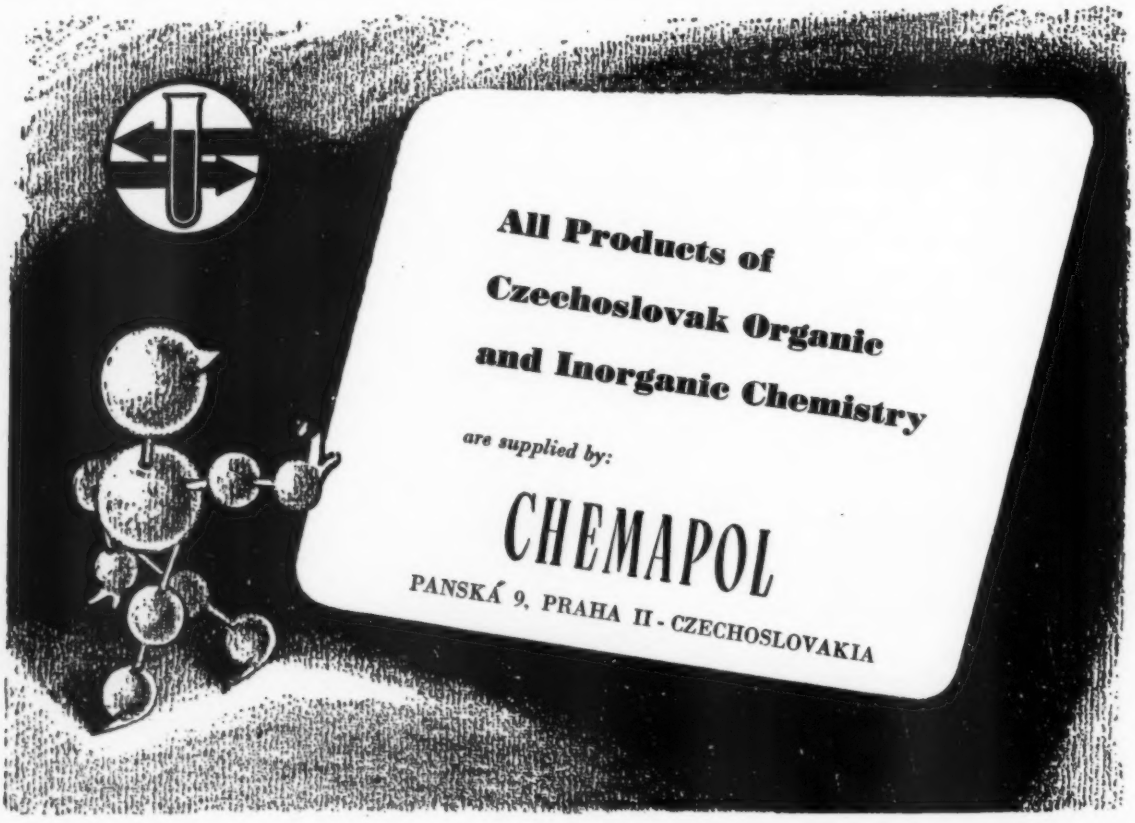

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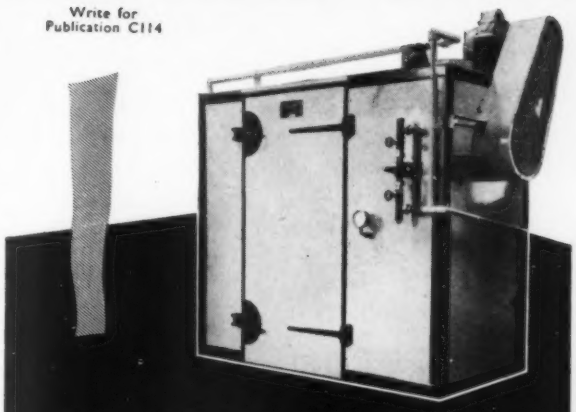

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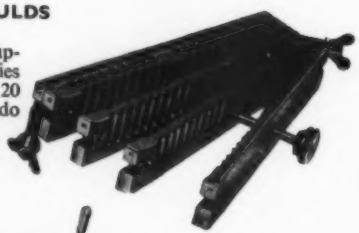

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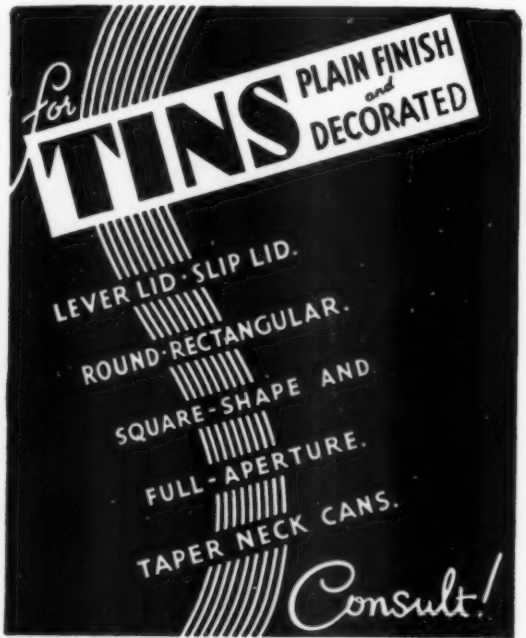

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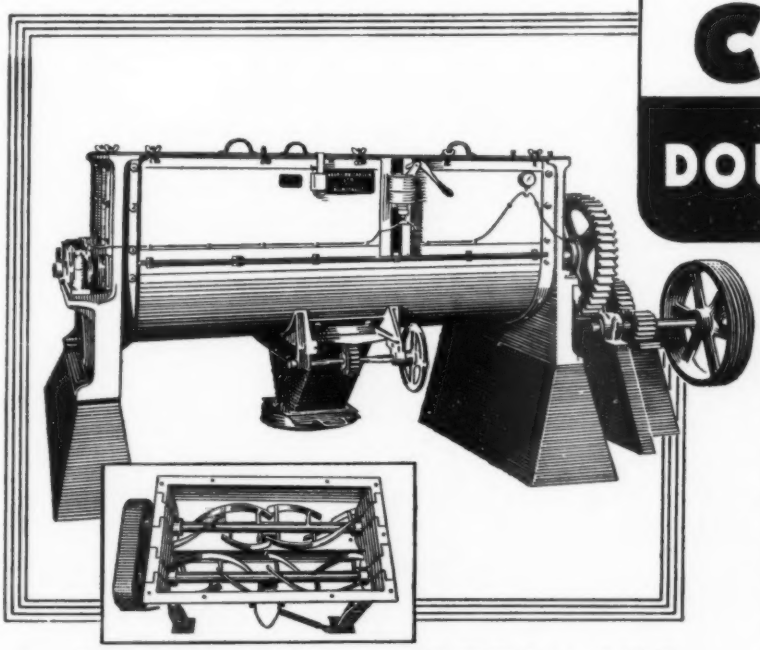

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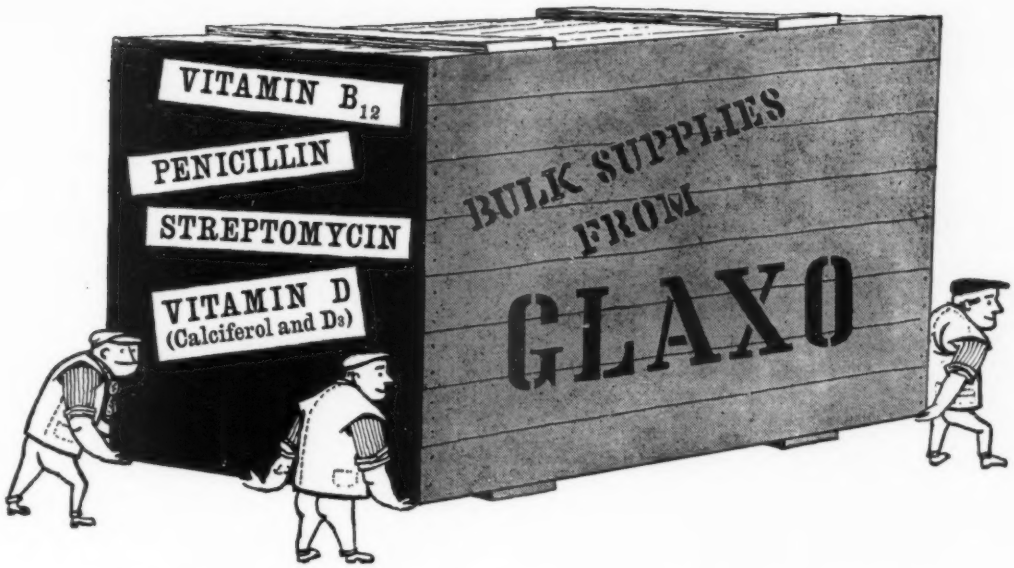

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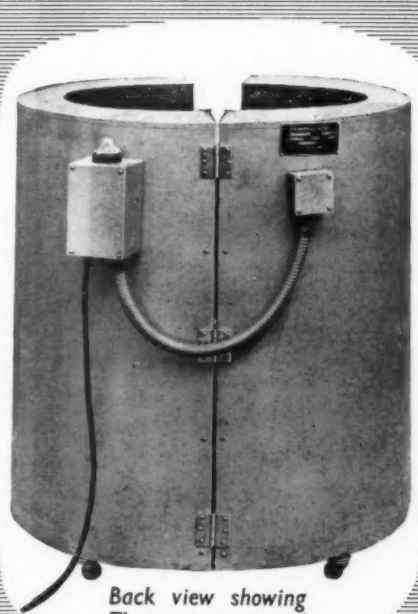

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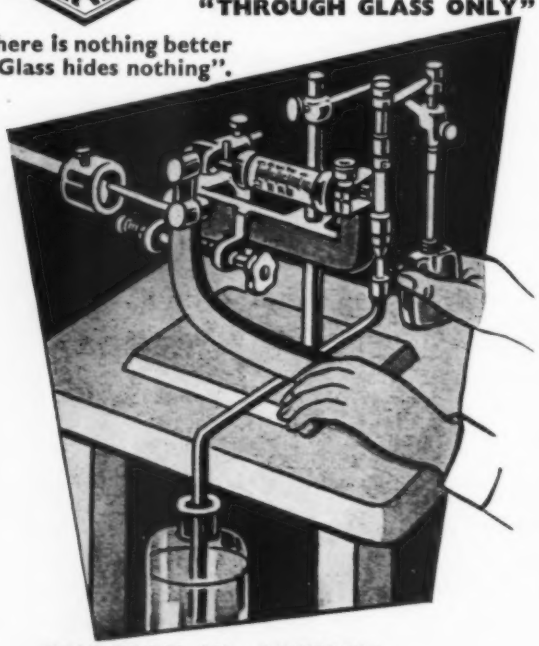

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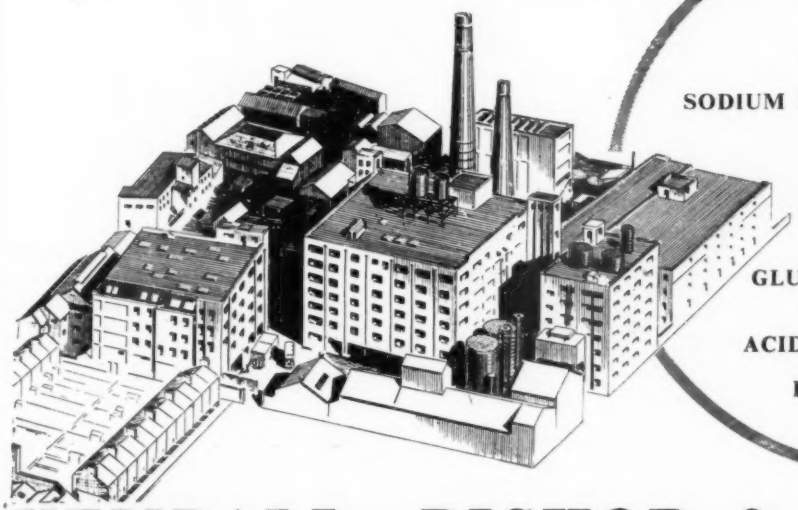

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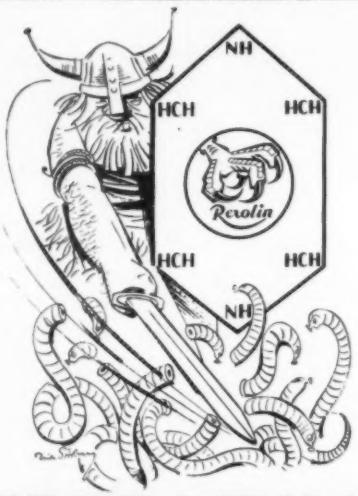

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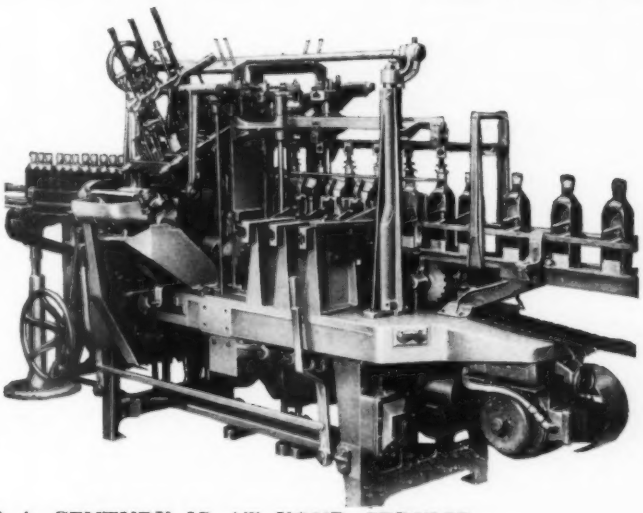

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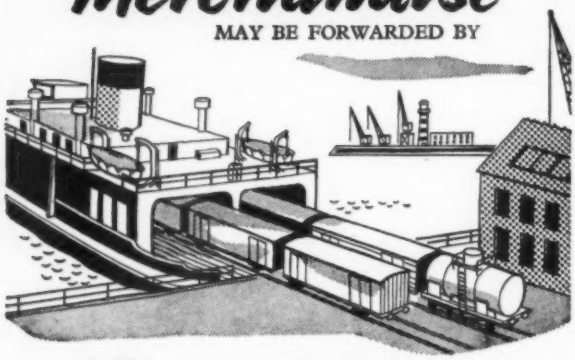

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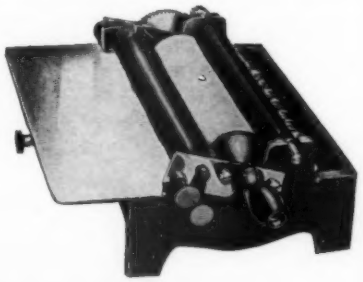

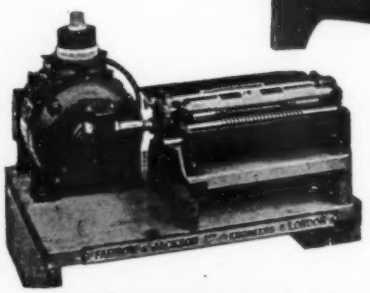

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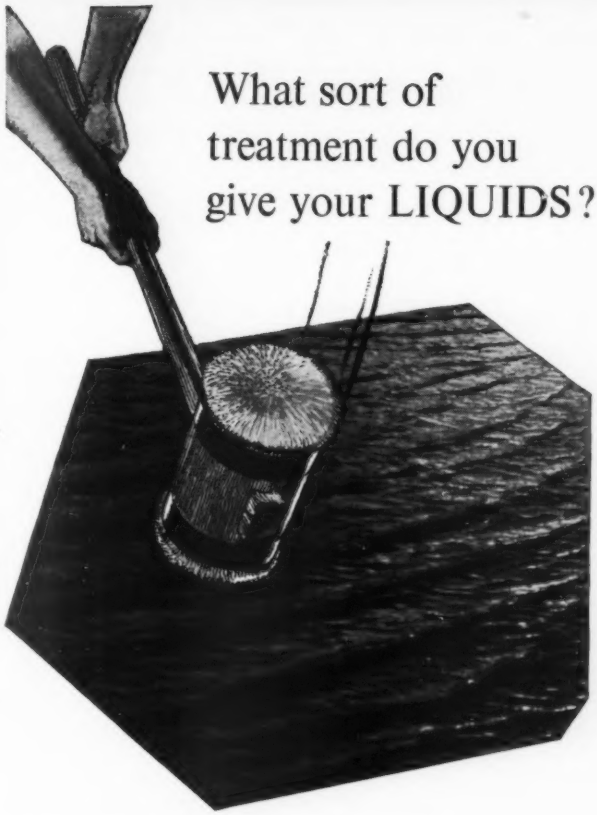

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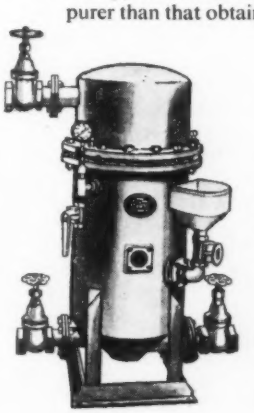

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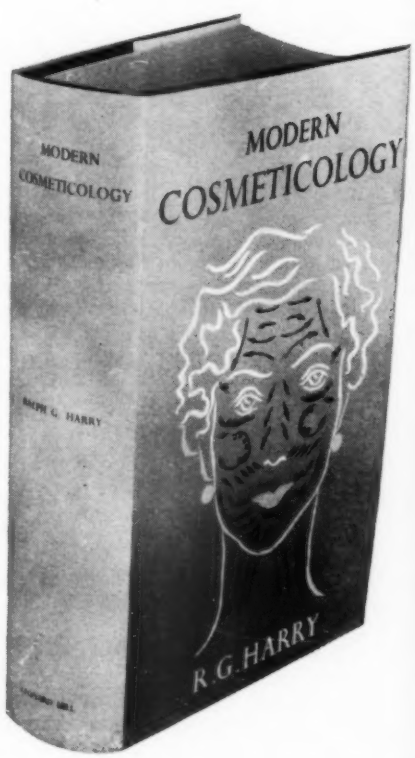

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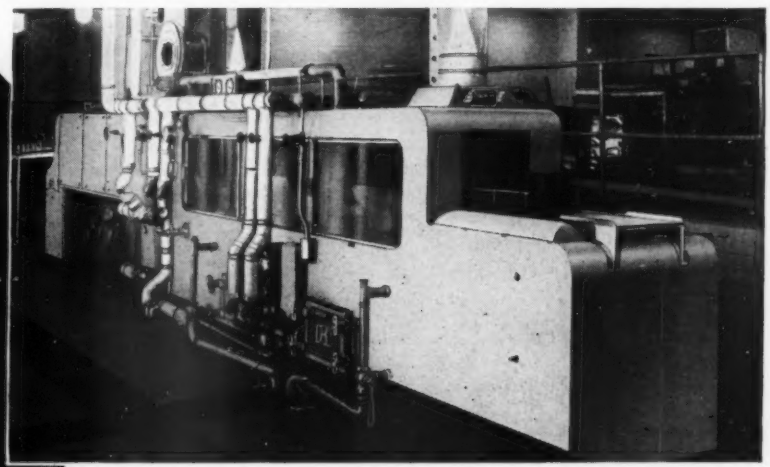

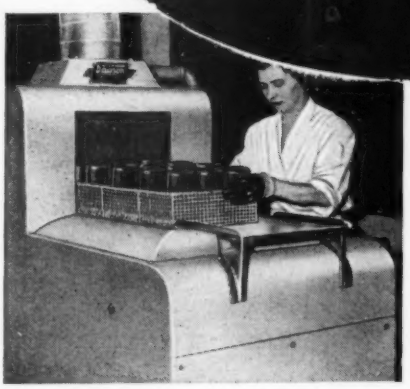

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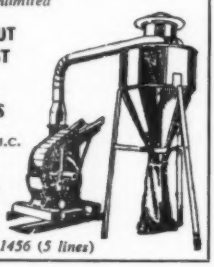

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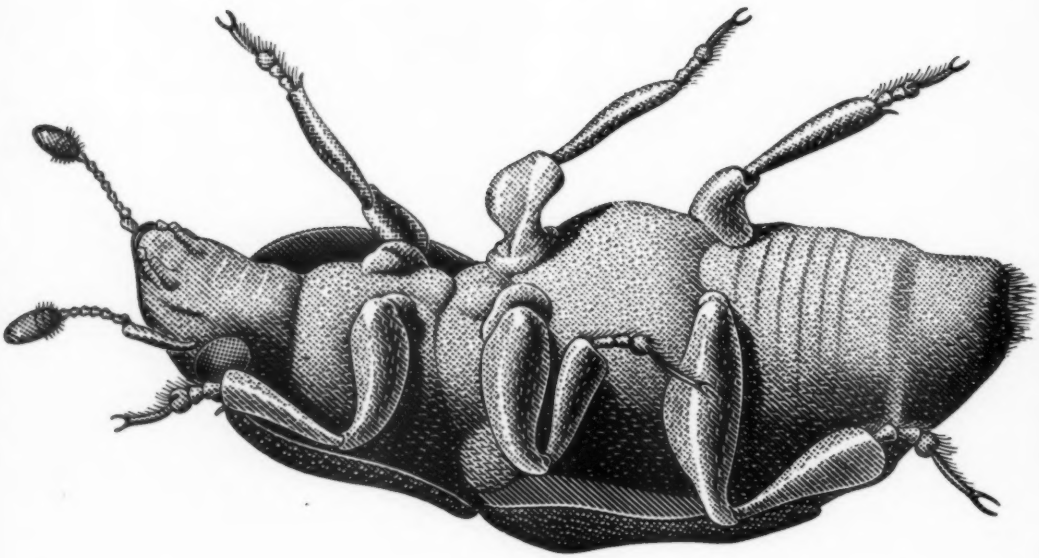

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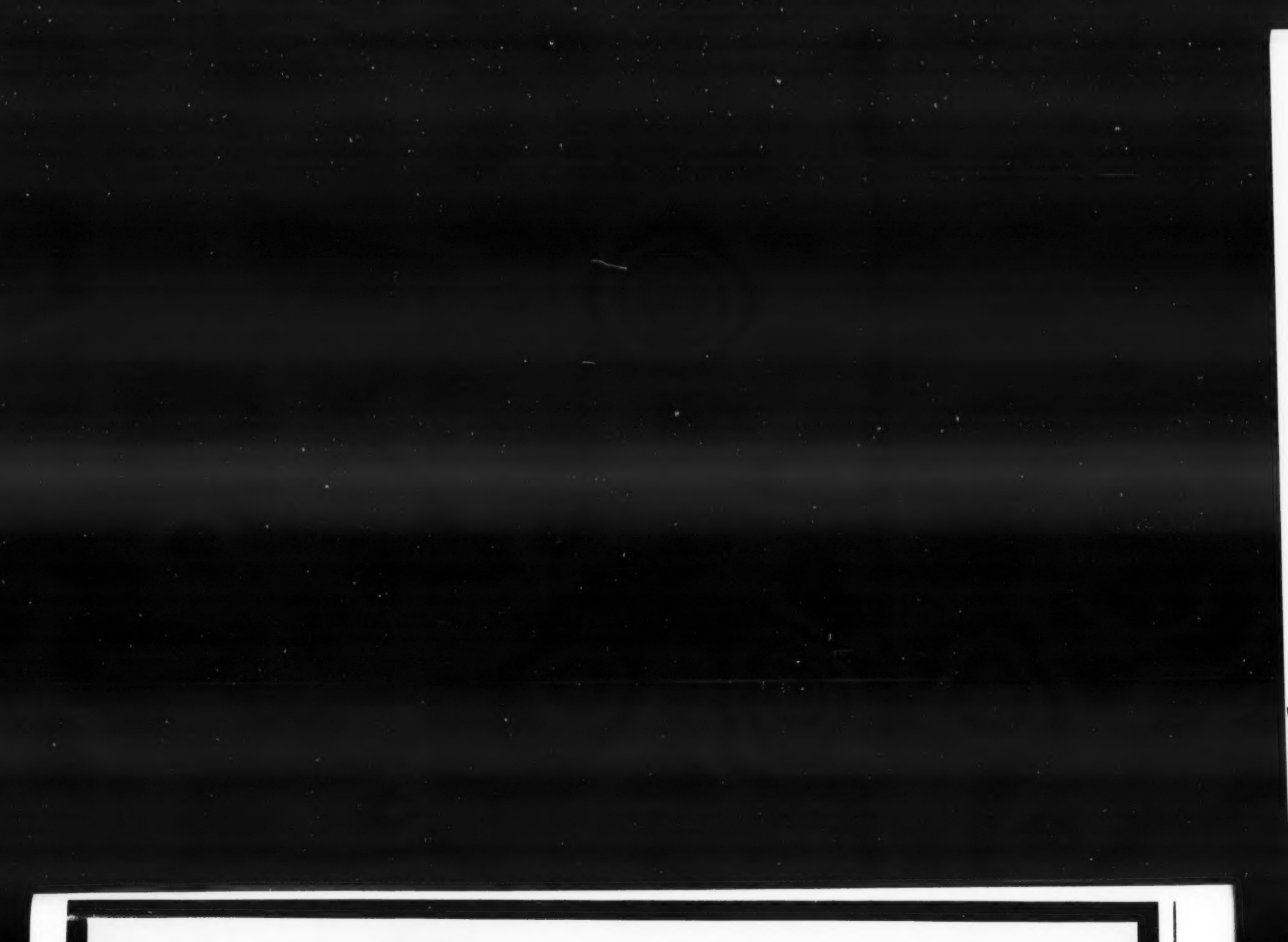
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